900 EPC

SERIES

EUROTHERM
CONTROLS

Handbook

HOW TO USE THIS MANUAL

If you have just received your 900 EPC:	
* Powering up your instrument	INSTALLATION ..... Chapter 1
* Learning how to use the instrument front panel	OPERATION..... Chapter 2
* Configuration of your instrument	CONFIGURATION..... Chapter 5
* Wiring up your instrument	INSTALLATION ..... Chapter 1
* Commissioning	COMMISSIONING..... Chapter 4
* Safety and EMC information	INSTALLATION ..... Chapter 1
If you wish to limit the access to certain instrument parameters by operators:	
* Allocating access levels to parameters	ACCESS LEVELS ..... Chapter 3
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900 EPC HANDBOOK

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Chapter 1

INSTALLATION

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IMPORTANT INFORMATION

RECEIVING AND UNPACKING YOUR INSTRUMENT

This unit is a precision electronic instrument, designed for applications in industrial control rooms, research labs etc. Its shipping container is designed to withstand reasonable shocks. Unpack it carefully, inspect the contents for damage, and keep the original packing materials if re-shipment is required.
If there is evidence of shipping damage, please notify Eurotherm or the carrier within 72 hours. The packaging should be retained for inspection by the manufacturer's representative and/or carrier.

CAUTION NOTE

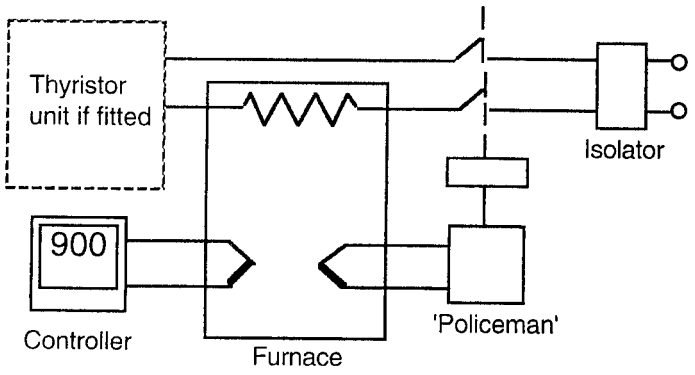
PLANT AND PERSONNEL PROTECTION

When designing any control system it is essential to consider what will happen if any individual part of the system malfunctions.
In a temperature control application, for example, the danger is that for some reason the heating system remains permanently switched on. This could happen if:-

1. Thermocouple or sensor becomes 'detached' from the system, i.e. is no longer measuring the actual temperature achieved.
2. Thermocouple, or thermocouple wiring, becomes short circuited.
3. Component failure within the controller in such a way as to leave the output switchedon.
4. Microprocessor or software failure in a system
5. Failure of a valve movement or valve linkage.
6. Remote setpoint to controller is faulty.
7. Operation by unauthorised personnel e.g.
   a) Controller left in manual with high output power set
   b) Setpoint set too high
8. Any lack of maintenance in serviceable parts

...and many other unforeseen situations.

If leaving the heater on all the time can cause damage either to the plant itself or its contents, then an independent protection device must be provided.



The best form of protection is a completely independent 'policeman'. This is a separate overtemperature alarm with its own thermocouple or sensor which, on alarm, will pull out the main contactor or shut off the valve to ensure the plant's safety.
The normal function of the 'Policeman' is to act as an over temperature alarm forming part of the overall process protection strategy. As such it is essential that all elements of the alarm system be regularly checked to ensure that they are in full working order. We recommend therefore that the system operation, including the 'policeman', be fully tested, on a weekly basis, in order to maximise process protection. See example shown.

GUIDELINES FOR SAFE USE OF ELECTRONIC EQUIPMENT

NOTE: All Eurotherm equipment is designed to operate in harsh industrial environments and is thoroughly tested. These guidelines represent good engineering principles for safe and trouble free operation and are recommended for all control equipment, whether from Eurotherm or any other supplier. They should be used in conjunction with local regulations.

OVERCURRENT PROTECTION
It is recommended that AC power supplies to instruments be protected by fuses or automatic circuit breakers rated at not more than 2 Amperes, and must be separated from any load current circuits.

VOLTAGE RATINGS
Care must be taken to ensure that maximum voltage ratings are not exceeded. Unless otherwise stated in the specification of any particular unit, the maximum voltage which may be applied between any two isolated circuits, or between any isolated circuit and earth, is limited to the highest rated supply voltage for that unit.
Take particular care not to connect AC supplies to low voltage control inputs such as sensor inputs, logic inputs and outputs.

ENCLOSURE OF LIVE PARTS
Some metal parts of certain types of equipment can become electrically 'live' in some conditions of normal operation.
Unless clearly intended to be panel mounted and accessible during normal operation, all units should be installed inside a suitable earthed metal enclosure to prevent live parts being accessible to human hands and metal tools.
It is recommended that rear terminal covers (available on most Eurotherm units) be fitted wherever possible.

WIRING
It is important to connect all equipment correctly in advance with the installation data provided for each type of unit.
Most connections to equipment require correct polarity to be maintained and due attention must be given to ensure this.
Unlabelled terminals must not be used as 'tie points' for other wires.
Conductors should be commensurate with voltage and current ratings of the units, and should conform to appropriate standards of good practice and local codes and regulations.

SCREENED CABLES

In installations where high electrical noise cannot be avoided, twisted pairs of screened cables are recommended as below:

Thermocouples inputs	Use screened compensating cable
Resistance Thermometers	Use screened cable
Logic Inputs/Outputs	Use screened twisted conductors
Analogue Control Outputs	Use screened twisted pairs
Logic Control Outputs	Use twisted pairs
Retransmission Signals	Use twisted pairs
Relay Outputs	Use standard cable

Where screened twisted pairs are used the screen must be earthed at one end only, preferably at the instrument.

ROUTING OF WIRING

Care should be taken to ensure maximum separation between low current control or signal wiring and power wiring.

Control wiring refers to those connections to the input of the controller, analogue or logic outputs, digital inputs, remote setpoint inputs and relays switching control signals.

Power wiring refers to those connections to relay or triac switched AC supplies, and wiring associated with external devices such as contactors, alarm relays or motor speed drives, etc.

It is essential that control and power wiring are routed separately through the cabinets and plant.

The A.C. supply, including earth, to all the controllers should be taken from as close to the incoming source as possible and should not under any circumstances be 'daisy chained' from other equipment, especially if it is likely to generate supply borne electrical noise.

Connections to ancillary equipment, such as contactors, should be taken directly from the supply and NOT from the supply terminals of all controllers.

For controllers with digital communications it is strongly recommended that screened cable is used and that only one end of the screen is earthed at the 'cleanest' end, usually at the computer. The screened cable should be routed with the control wiring. Do not use 'spare' wires in the cable for other signals.

If other screened cable is used, eg between instrument and sensor, the screen must be earthed at one end only. Preferably at the instrument.

EARTHING

All earth terminals must be securely connected directly to a good local earth by conductors appropriate to the current rating of the units.

Most Eurotherm instruments have internal circuits which are isolated or 'floating'. This is necessary to prevent the occurrence of an 'earth loop' in signal circuits. To avoid possible shock hazards in the event of an internal fault causing breakdown of insulation, it is recommended that all equipment connected to any Eurotherm unit be enclosed in an earthed metal enclosure. Sheaths of thermocouples (or other sensors) should be properly earthed by a separate conductor (instead of being dependent on earthing via the machine framework).

SUPPLY ISOLATORS

Every electrical system should be provided with means for isolating the system from the AC supply to allow safe working during repair and maintenance. Thyristors and triacs are not adequate means of isolating the supply and should always be backed by a suitable mechanical isolator.

SUPPLY IMPEDANCE

Control cabinets and equipment should be sited as close to the incoming supply as possible. This is essential on high power systems using thyristors driving large transformer loads. In all cases, both inside and outside the cabinet, long supply cables should be avoided. If they are unavoidable, conductors of an adequate rating must be used. Avoid running instruments from a supply which has shared wiring with high current circuits, particularly if these are switched by contactors or thyristors.

HAZARDOUS ATMOSPHERES

No product should be connected to a circuit which passes into or through a hazardous area unless appropriate precautions are taken (even though the instrument itself may be located in a safe area). Such an installation should conform to the requirements of the relevant local regulations.

Unless categorically stated in the published specification of any particular unit, it should be assumed they are not suitable for direct use in areas subject to hazardous atmospheres.

CAUTION

If it becomes necessary to remove or replace any circuit board contained in the instrument, or remove any internal electrical connector, make certain the power is OFF, or disconnected. Some circuit boards contain static sensitive components. Before you remove any board make certain that you, the area in which you place it, or work on it, and the board are properly electrostatically grounded.

Do not exceed the maximum voltage rating for the instrument.

FAILURE TO OBSERVE THE PRECAUTIONS LISTED ABOVE COULD LEAD TO FAILURE OF THE INSTRUMENT'S CIRCUITRY. FAILURES SO CAUSED ARE OUTSIDE THE MANUFACTURER'S WARRANTY.

IF IN DOUBT, ASK!

If you have any questions regarding any aspect of installing, operating or servicing your Eurotherm equipment, please contact your nearest Eurotherm Sales and Service Engineer.

COMMUNICATIONS WIRING

Recommended connections for RS422.

In many installations communications wiring will work with simple point to point wiring. See section 6.

PHASE OPERATION

This instrument has been designed and fully tested for single phase operation on supplies up to 264Vac. This not only includes the power supply input but all relay and triac outputs, whatever their function, and the terminals to which they are connected.

Care must be exercised during installation and wiring of this unit to ensure that no connections are made from phases other than the one being used to power the instrument. Failure to observe this precaution may result in instrument damage and or failure.

INSTALLATION

If the instrument is to be panel mounted a DIN-size 92mm by 92mm cut-out is required as illustrated.
Should the instrument be required to be sealed to the panel surface, up to IP65, follow the instructions detailed in 'Instrument Sealing' paragraph 1.2.
Insert the instrument through the cutout via the front of the panel. Install the mounting clamps, one on the top and the other below the instrument. These clamps are located from the rear. Ensure that the four feet are firmly seated in the slots in the case, as shown in figure 1.
Tighten the screws firmly with a screwdriver from the rear of the mounting panel; a torque limiter in each clamp prevents over-tightening

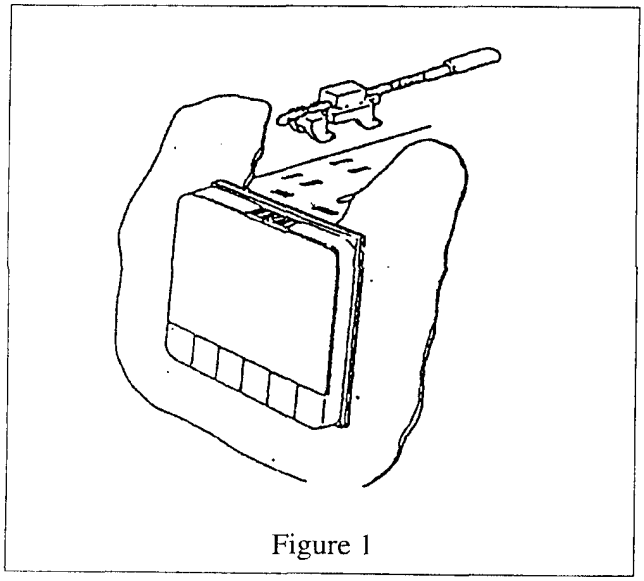
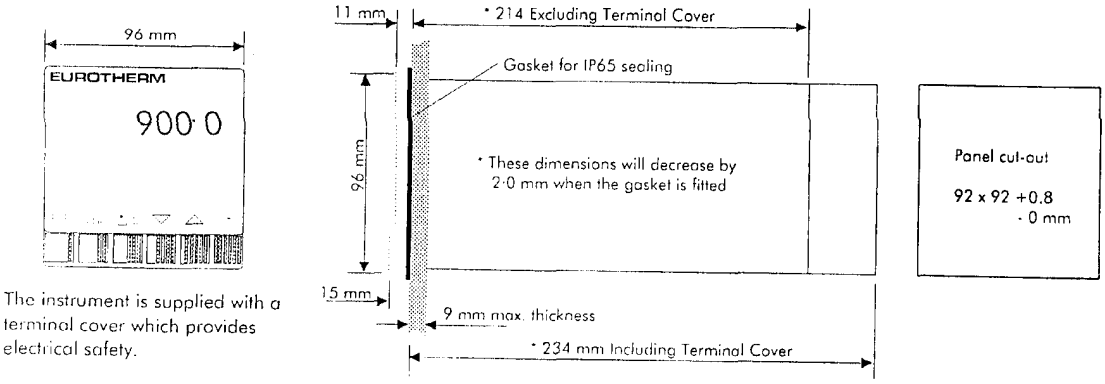


Figure 1

Dimensional Details



Instrument Sealing

Supplied within the packaging of the instrument, in a separate polythene bag, is a rubber seal. When this seal is correctly placed between the sleeve and the panel surface it will provide protection to the IP65 standard.
If protection of the instrument is not required this seal need not be fitted and only the installation instructions need be followed.
Fitting the seal should be carried out as soon as the instrument is removed from the packing. Place the seal over the front of the instrument so that it sits as shown in figure 2, against the back of the bezel. The instrument can now be mounted into the panel cut-out and assembly continued as described in the installation instructions.

Note: It is important that the panel cut out dimensions are adhered to for IP65 to be effective. There must be no sharp or burred edges.

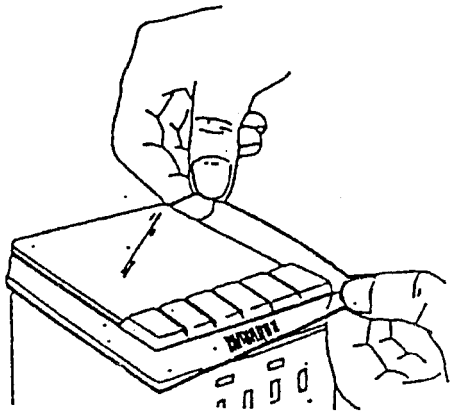


Figure 2

Rear Terminal Cover

To remove the rear terminal protection cover four catches have to be released, two at the top and two at the bottom. Insert the tool supplied to release each pair of catches.
Refit the cover so that the four catches engage in their respective slots.

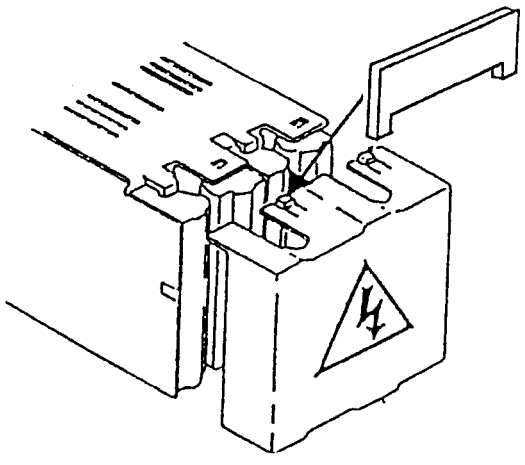


Figure 3

CONNECTIONS AND WIRING

Electrical connections are made via individual screw terminal blocks on the rear of the instrument. All connections are low current and a 16/0.20 wire size is adequate.
Wires, once connected to the instrument, can be run up/down the trough and secured by ties as shown in figure 4.
The instrument supply should be fused externally, in accordance with local wiring regulations.

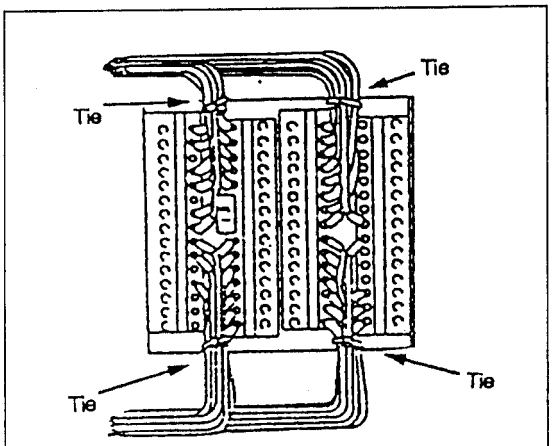


Figure 4

Instrument Labels

Labels on the instrument and case indicate the specific configuration and terminal number connections for the instrument.
This label is found on the sleeve of the instrument and indicates the rear terminal connections for the instrument ordered.

Code : 905S/HRE/CTR/ADR/SDE/ES/VH/TH/LE
(1A/HA/CA/AAB/SAB/EAA/TA)/0/1200/C/03

Serial Number: G34534-001-008-03-90

	A	B	C	D	E	F	G	H	
	REM1	ALM1		HEAT	COOL	ALM	PV2	PV1	
1		N/C		N/C		N/C			
2		N/C		N/C	LINE	N/C		V-	
3		COMM		COMM	LOAD	COMM			
4	DCI+	N/C				N/C		V+	
5	DCI-	N/O				N/O			

This label is found on the rear of the instrument and indicates the ordering code, serial no. etc.

Code : 905S/HRE/CTR/ADR/SDE/ES/VH/TH/LE
(1A/HA/CA/AAB/SAB/EAA/TA)/0/1200/C/03//

SN : G34534-001-008-03-90
SW VER : 2.11 Service Tel: 0273 919191 EI

Instrument Layout

The 900 series of instruments can easily be configured to most customer requirements on site. The microprocessor, power supply and display boards are standard to all 900 series instruments, see figure 5. Various plug-in hardware modules can then be fitted to provide the different functions. These modules can be allocated to one or two options boards as required. Each option board contains three slots which are pin related to the rear terminals as shown in figure 6. Note; To remove the instrument from the sleeve press the ribbed sections top and bottom of the bezel together and pull outwards.

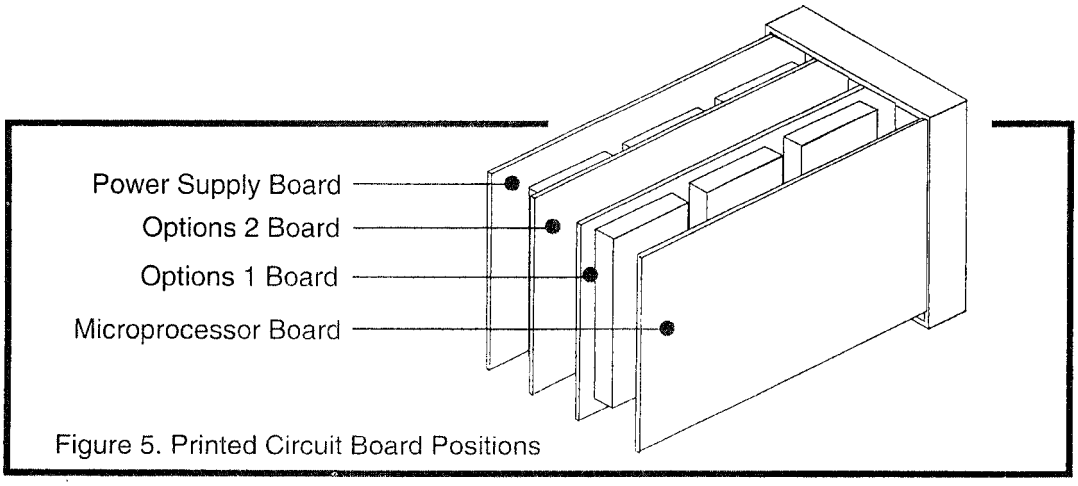


Figure 5. Printed Circuit Board Positions

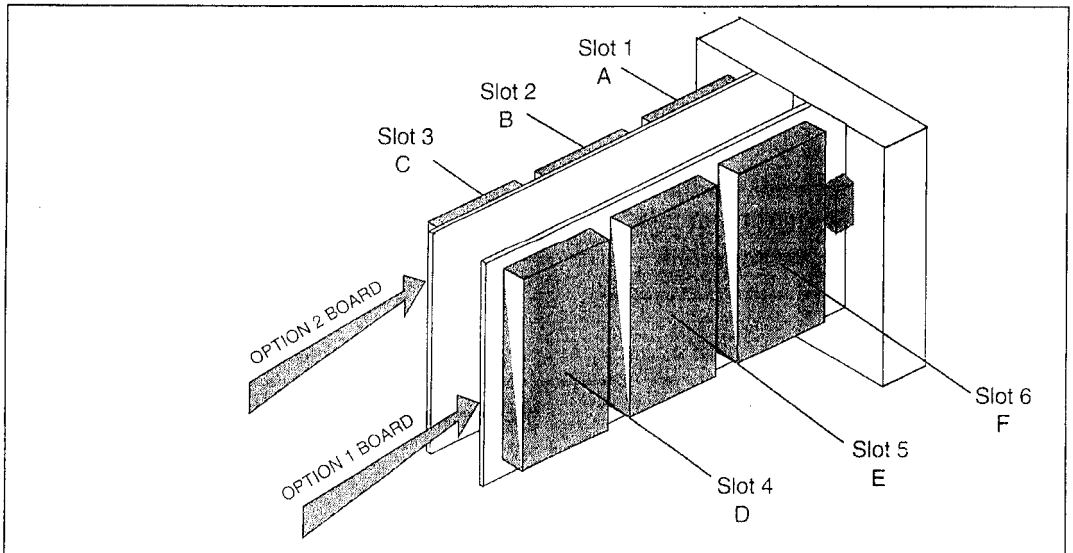
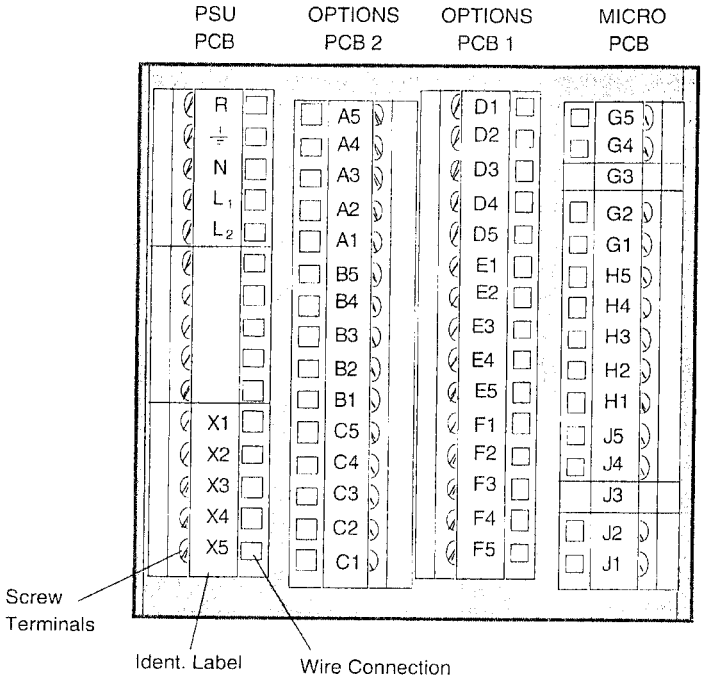
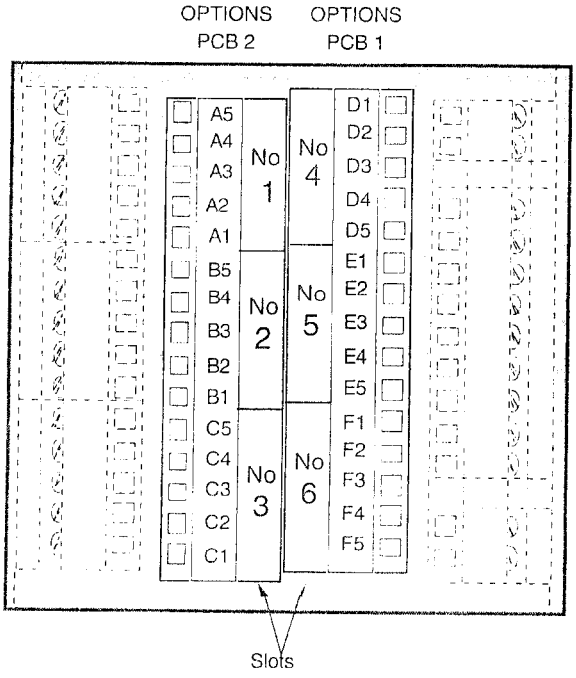


Figure 6. Plug-in Module Slot Positions

Rear Terminal Connections





Product Coding

905S - IS - H(2) - C(3) - A*(4) -S(5) -R(6) -E(7) -V(10) -X(11) - LE - (14)
906S - IS - H(2) - C(3) - A*(4) - S(5) -R(6) -E(7) -V(10) -X(11) - LE - (15)
907S - IS - H(2) - D(3) - A*(4) - S(5) -R(6) -E(7) -V(10) -X(11) - LE - (14)
908S - IS - H(2) - D(3) - A*(4) - S(5) -R(6) -E(7) -V(10) -X(11) - LE - (15)
911S - LP1 - IS - A*(4) - S(5) - R(6) -E(7) -LP2 - IS - H(2) - C(3) -V(10) - X(11) - LE - (14)
912S - LP1 - IS - A*(4) - S(5) - R(6) -E(7) -LP2 - IS - H(2) - C(3) -V(10) - X(11) - LE - (15)
940S - I(1a) -P(2) - O(3) - A*(4) - S(5) -R(6) -E(7) -V(10) - X(11) - LE - (14)
941S - I(1a) -P(2) - O(3) - A*(4) - S(5) -R(6) -E(7) -V(10) - X(11) - LE - (15)
942S -I(1a) -P(2) - O(3) - A*(4) - S(5) -R(6) -E(7) -V(10) - X(11) - LE - (14)
943S -I(1a) -P(2) - O(3) - A*(4) - S(5) -R(6) -E(7) -V(10) - X(11) - LE - (15)
944S - LP1 - I(a) - A*(4) - S(5) - R(6) - E(7) - LP2 - I(1) - P(2) - O(3) -V(10) -X(11)- LE - (14)
945S - LP1 - I(a) - A*(4) - S(5) - R(6) - E(7) - LP2 - I(1) - P(2) - O(3) -V(10) -X(11)- LE - (15)
960S - IS - IV - P(2) -O(3) - A*(4) - S(5) -R(6) - E(7) - V(10) -X(11) - LE - (13) - (14)
961S - IS - IV - P(2) -O(3) - A*(4) - S(5) -R(6) - E(7) - V(10) -X(11) - LE - (13) - (15)
964S - I(1)' - I(1) - P(2) -O(3) - A*(4) - S(5) -R(6) - E(7) - V(10) - X(11) - LE - (14)
969S - I(1) - I(1) - H(2) -C(3) - A*(4) - S(5) -R(6) -E(7) - V(10) - X(11) - LE -(14)
970S - I(1) - I(1) - H(2) -C(3) - A*(4) - S(5) -R(6) -E(7) - V(10) - X(11) - LE -(15)
971S - I(1) - I(1) - H(2) -O(3) - A*(4) - S(5) -R(6) - E(7) - V(10) - X(11) - LE -(14)
972S - I(1) - I(1) - H(2) -C(3) - A*(4) - S(5) -R(6) - E(7) - V(10) - X(11) - LE - (15)
905D - LP1 - IS - H(2) - C(3) - (8) - LP2 - IS -H(2) - C(3) - (8) -V(10) - X(11) - LE - (14)
906D - LP1 - IS - H(2) - C(3) - (8) - LP2 - IS -H(2) - C(3) - (8) -V(10) - X(11) - LE - (15)
909D - LP1 - IS - H(2) - D(3) - (8) - LP2 - IS -H(2) - C(3) - (8) -V(10) - X(11) - LE - (14)
910D - LP1 - IS - H(2) - D(3) - (8) - LP2 - IS -H(2) - C(3) - (8) -V(10) - X(11) - LE - (15)
913D - LP1 - IS - H(2) - C(3) - (8) - LP2 - (1a) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (14)
914D - LP1 - IS - H(2) - C(3) - (8) - LP2 - (1a) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (15)
940D - LP1 -I(1a) - P(2) - O(3) - (8) - LP2 - I(1a) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (14)
941D - LP1 -I(1a) - P(2) - O(3) - (8) - LP2 - I(1a) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (15)
942D - LP1 -I(1a) - P(2) - O(3) - (8) - LP2 - I(1) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (14)
943D - LP1 -I(1a) - P(2) - O(3) - (8) - LP2 - I(1) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (15)
962D - LP1 - I(1) - P(2) - O(3) - ESV - LP2 - I(1) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (14)
963D - LP1 - I(1) - P(2) - O(3) - ESV - LP2 - I(1) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (15)
965D - LP1 -I(1a) - P(2) - O(3) - (8) - LP2 -I(1a) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (14)
966D - LP1 -I(1a) - P(2) - O(3) - (8) - LP2 -I(1a) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (15)
967D - LP1 - I(1) - P(2) - O(3) - (8) - LP2 - I(1) - P(2) - E(9) - (8) -V(10) -X(11) - LE - (14)
968D - LP1 - I(1) - P(2) - O(3) - (8) - LP2 - I(1) - P(2) - E(9) - (8) - V(10) -X(11) - LE - (15)
971D - LP1 - I(1) - P(2) - O(3) - (8) - LP2 - I(1) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (14)
972D - LP1 - I(1) - P(2) - O(3) - (8) - LP2 - I(1) - P(2) - O(3) - (8) -V(10) - X(11) - LE - (15)

* For Master Communications, 'A' should be replaced with'R'

Terminal	A B C D E F
Code	988S - 2 - 3 - 3 - 4 - 3 - 3 - 3 - 5 - 6 - 7 - 8 - 9 - 10
	989S - 2 - 3 - 3 - 4 - 3 - 3 - 3 - 5 - 6 - 7 - 8 - 9 - 10

Terminal	A B C D E F
Code	988D - 2 - 2 - 3 - 3 - 4 - 3 - 3 - 3 - 5 - 6 - 7 - 8 - 9 - 10
	989D - 2 - 2 - 3 - 3 - 4 - 3 - 3 - 3 - 5 - 6 - 7 - 8 - 9 - 10

	Code	Terminals
2 . INPUT		J2 - J4/ G2 - G4
3. OPTION (*)		
Relay	RE	..1-..2- ..3
Logic	LO	..4 -..5
Dual Relay	DR	..1 to ..5
Dual Triac	DT	..2 - ..3 - ..5
Valve Position Rekay	VR	..1 to ..5
Valve Position (Triac)	VT	..2 -..3 -..5
Quad Logic Input	LI	..1 to ..5
Tri Logic Output	L3	..1 to ..5
Quad Logic Output	L4	..1 to D5
DC (Voltage)	DV	..4 -..5
DC (Current)	DC	..4 - ..5
Retransmission (Voltage)	RV	..4 - ..5
Retransmission (Current)	RC	..4 - ..5
Position Pot	PP	..1-..4 - ..5
Remote Input (Voltage)	SV	..3 - ..5
Remote Input (Current)	SC	..3 - ..5
Transducer 5Volts	GA	..1 to ..5
Transducer 10 Volts	GB	..1-..4 -..5
Transducer 24 Volts	GC	..1-..4 -..5
4. OPTION		
Relay	RE	C1-C2- C3
Logic	LO	C4 -C5
Dual Relay	DR	C1 to C5
Dual Triac	DT	C2 - C3 - C5
Valve Position Relay	VR	C1 to C5
Valve Position (Triac)	VT	C2 -C3 -C5
Quad Logic Input	LI	C1 to C5
Tri Logic Output	L3	C1 to C5
Quad Logic Output	L4	C1 to C5
DC (Voltage)	DV	C4 -C5
DC (Current)	DC	C4 - C5
Retransmission (Voltage)	RV	C4 - C5
Retransmission (Current)	RC	C4 - C5
Position Pot	PP	C1-C4 - C5
Remote Input (Voltage)	SV	C3 - C5
Remote Input (Current)	SC	C3 - C5

(*) :See the preceding table to determine the actual terminal

Safety Earth Connection

Before connecting electrical supplies to this unit, ensure that a protective earth connection is made to the protective terminal on top of the sleeve and marked with the following symbol:

Power Supply Connections

The power supply can be connected to a 85V to 264V a.c. supply or, by using an alternate power supply board, a low voltage a.c. or d.c. supply. The low voltage board requires a 20V to 30V a.c. or 17.5V to 30V d.c. supply. If a low voltage d.c. supply is used the positive terminal must be connected to the 'L' terminal.

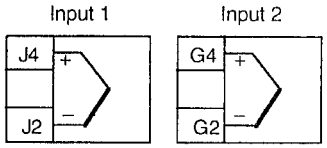
Terminal Marking	Terminal Function	Connections for 85 to 264V a.c.	Connections for 20 to 30V a.c.	Connections for 17.5 to 30V d.c.
	Ground	Supply Earth	Supply Earth	Supply Earth
N	Neutral	Supply Neutral	Supply Neutral	Supply -ve
24	Line 24V a.c. / d.c.	No Connection	Supply Live	Supply +ve
L	Line 85-264V a.c.	Supply Live	No Connection	No Connection

The ground connection on the supply terminal block is not a safety earth. This connection is a functional earth provided for the purpose of grounding EMC filters.

Inputs

One or two process inputs are always provided on the instrument, input 1 and input 2, dependent on instrument type, which can be configured to be high or low level.

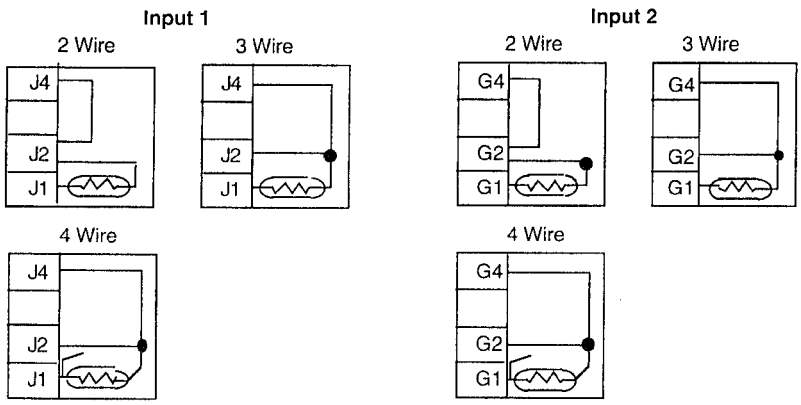
Thermocouple



When the instrument has been configured for internal cold junction compensation (CJC), compensation cable of the correct type for the thermocouple used or the thermocouple itself must be wired to these terminals. Copper wire must NOT be used.

If an external cold junction (oven/ice reference) is to be used then copper wires must be used between the rear terminals of the instrument and the cold junction reference.

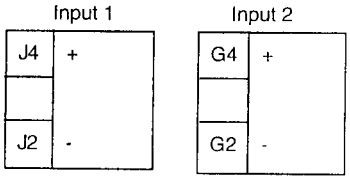
Resistance Thermometer



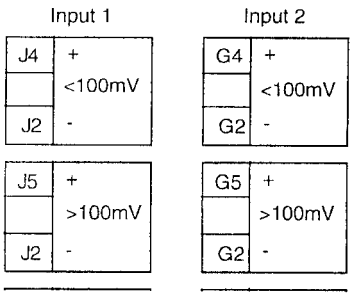
Note: Only when three conductors between the bulb and the rear terminals have identical resistances will the lead resistance error be minimised. If a two wire system is used the lead resistance will give errors. When a four wire RTD is used the fourth wire is insulated from all other connections.

Pyrometer

For pyrometers requiring a resistive load a burden resistor assembly will be supplied.This burden resistor must be connected across terminals 2 and 4 (polarity is not important) together with the external wiring. An area on the top of the burden resistor assembly is colour coded to indicate the value of the resistor:- YELLOW - 500Ω for Pyrometer Inputs.

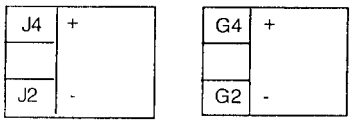


DC Signals



For inputs less than 100mV use terminals 2 and 4, polarity as shown.
For inputs from 100mV to 10V use terminals 2 and 5, polarity as shown.

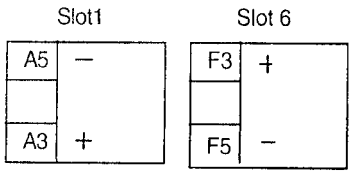
For mA inputs a burden resistor assembly will be supplied.



This burden resistor must be connected across terminals 2 and 4 (polarity is not important) together with the external wiring, so that the resistor terminates the incoming control signal.
An area on the top of the burden resistor assembly is colour coded to indicate the value of the resistor:- RED - 5Ω for Process Value mA inputs.

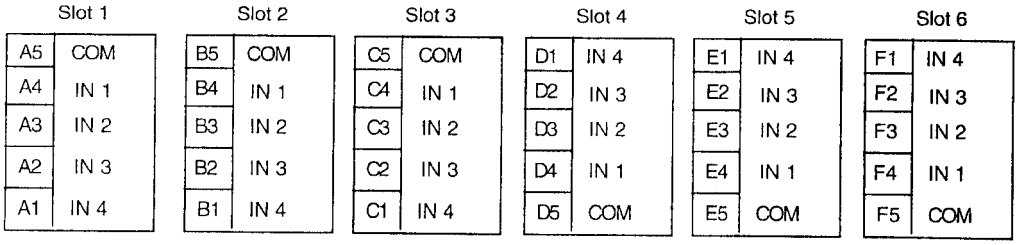
Remote Inputs

One or two remote inputs are available in slots 1 / 6 for voltage inputs of -10V to +10V. For current inputs a burden resistor must be connected across terminals 3 and 5 (polarity is not important) together with the external wiring, so that the resistor terminates the incoming control signal.



An area on the top of the burden resistor assembly is colour coded to indicate the value of the resistor: BROWN - 50Ω, YELLOW - 500Ω, which are range dependent for mA inputs.

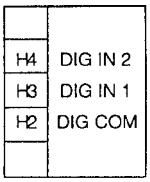
Quad Logic Inputs



To activate any of these inputs connect a device between the particular input and the common, by either a resistance of less than 100Ω, or a voltage of less than 0.7 volts d.c. For an input to be switched to the inactive state, the input device must have a resistance greater than 28kΩ, or a voltage greater than 4.0 volts d.c.

Digital Inputs

Two digital inputs are available on all types of instrument.



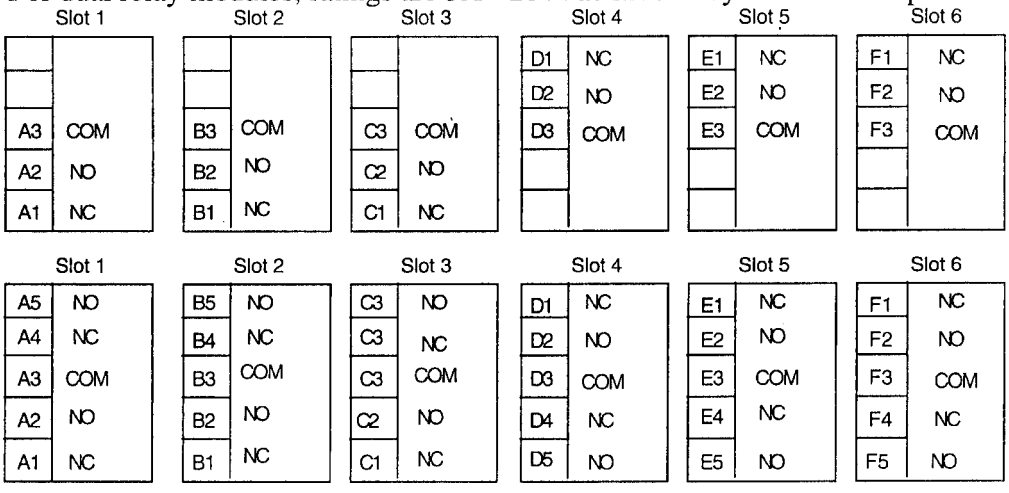
Outputs

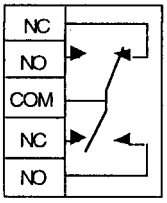
Relay Outputs

There are two kinds of relay modules: Single and dual. Relays intended for use as alarms are delivered 'de-energised in alarm' to ensure that the alarm will activate if the power supply to the instrument is cut.

For a single relay module the contacts are rated at 2A - 264Vac

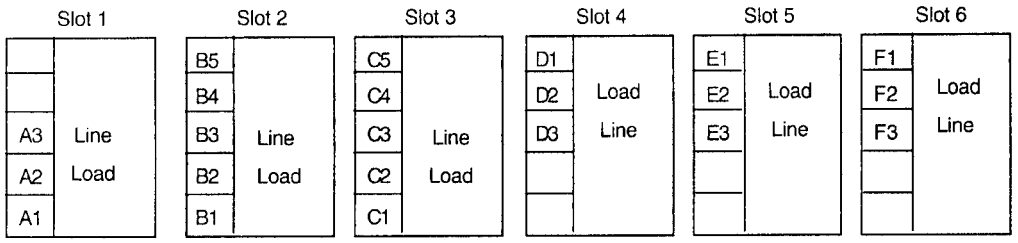
For dual relay modules, ratings are 3A - 264Vac limited by the common pin.



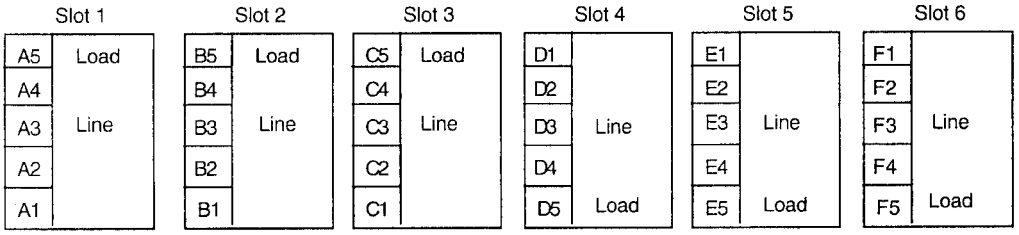


Triac Outputs (0.75A/264V r.m.s.)

Output 1

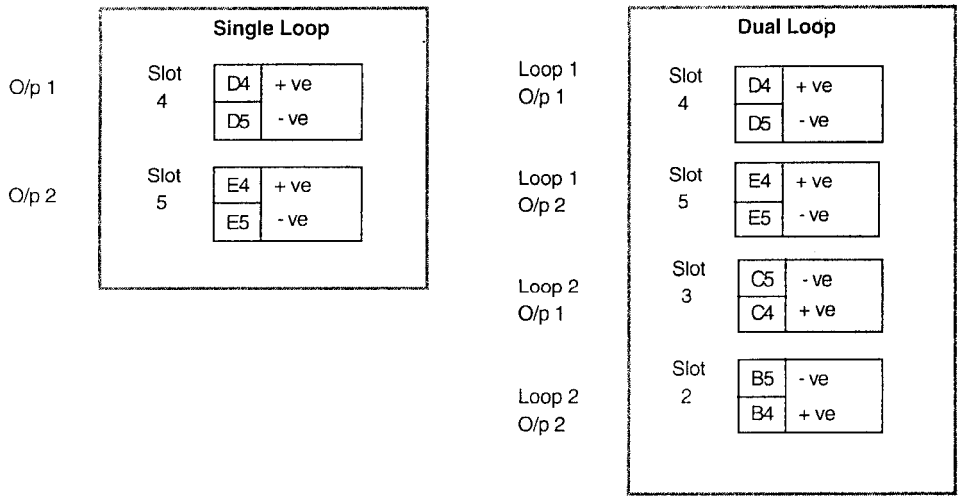


Output 2



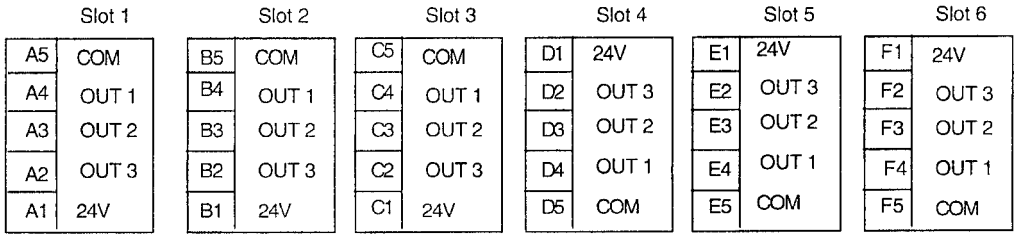
The live supply is connected to the LINE terminal. One side of the load is connected to the LOAD terminal, the other side of the load should be connected to the neutral line.Please note that the LINE is common in the dual output module.

DC Control, Logic Outputs



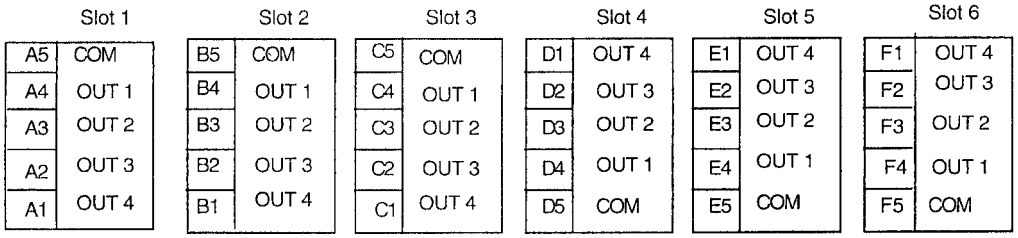
These outputs are isolated dc signals, or logic time proportioning or on/off action. Maximum output current is 20mA at 15V.

Triple Logic Outputs



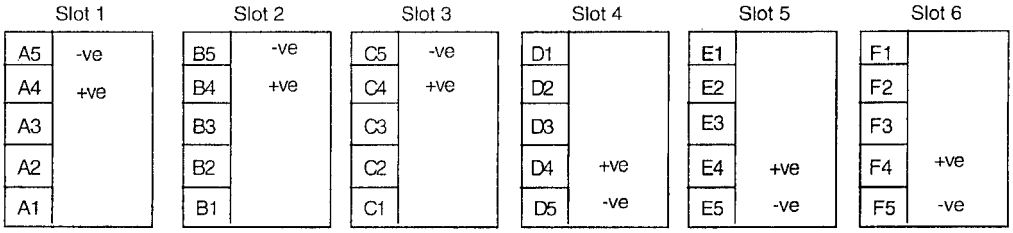
Each module provides three open collector outputs.

Quad Logic Outputs



Each module provides four 5V logical outputs.

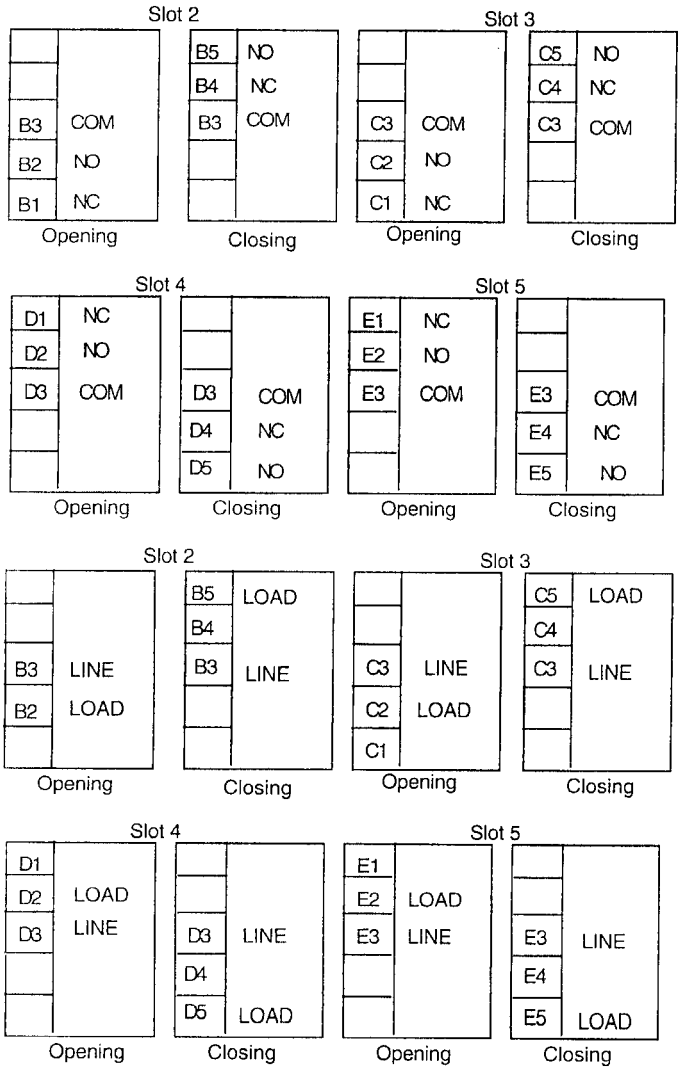
DC Retransmission



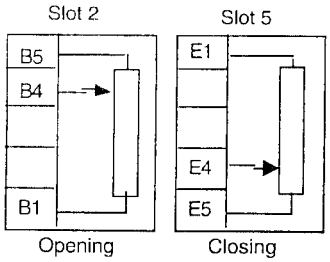
This type of output module can be used for analogue retransmission of the measured value, the setpoint, the error or calculated values.

Valve Positioner Module

The 900 EPC provides dual relay or triac modules for valve position control outputs.



Position Feedback Potentiometer (100 to 1K ohms)

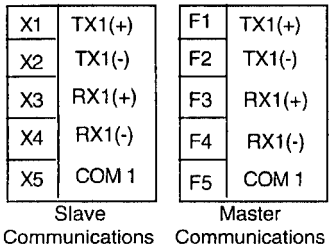


It is not necessary to wire up a feedback potentiometer before commissioning the loop. The potentiometer allows the controller to display the valve position and allows valve travel limits to be set up.

Digital Communications

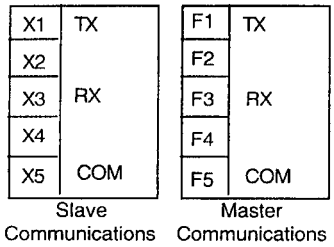
"Slave' digital communications circuitry is available as standard and is mounted on the power supply board. Connections should be made to the terminals marked with "X". 'Master' digital communications (digital retransmission) is available as an option and is provided using a module which must be located in slot 6; connections in this case are made to the terminals marked with 'F'.

Digital Communications - RS422(485)



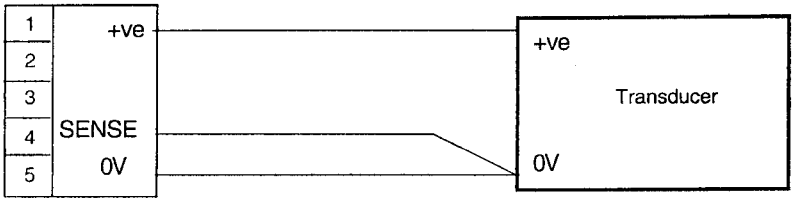
Terminal 5 is the common and is normally connected to earth via the communications bus. The RS422 interface utilises terminals 3 and 4 for the positive and negative receiver lines and terminals 1 and 2 for the positive and negative transmitter lines.

Digital Communications - RS232



Terminal 5 is the common line. Terminals 1 and 3 are the transmitter and receiver lines for the RS232 interface.
The communications in the slot on the PSU board is always available.

Transducer Power Supply



The power supply for a transducer can be either internal or external. If internal the transducer power supply module can be located in any of the slots,1 to 5. Connections are as shown above.The +ve and 0V lines must be of the same length and type of wire if accuracy is to be obtained.
The sense line checks the 0V line for any discrepency in voltage and is therefore connected to the 0V at the transducer. Internal supplies available are 5V, 10V, 12V or 24Vdc.

SAFETY AND EMC INFORMATION

Please read this section before installing the controller

This controller is intended for industrial temperature and process control applications when it will meet the requirements of the European Directives on Safety and EMC. Use in other applications, or failure to observe the installation instructions of this handbook may impair safety or EMC. The installer must ensure the safety and EMC of any particular installation.

Safety

This controller complies with the European Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, by the application of the safety standard EN 61010.

Electromagnetic compatibility

This controller conforms with the essential protection requirements of the EMC Directive 89/336/EEC, amended by 93/68/EEC, by the application of a Technical Construction File. This instrument satisfies the general requirements of the industrial environment defined in EN 50081-2 and EN 50082-2. For more information on product compliance refer to the Technical Construction File.

GENERAL

The information contained in this manual is subject to change without notice. While every effort has been made to ensure the accuracy of the information, Eurotherm Controls shall not be held liable for errors contained herein.

Unpacking and storage

The packaging should contain an instrument mounted in its sleeve, two mounting brackets for panel installation and this operating book. Depending on the exact order code there may be one or more ferrite rings. If on receipt, the packaging or the instrument are damaged, do not install the product but contact your nearest Eurotherm Controls agent.
If the instrument is to be stored before use, protect from humidity and dust in an ambient temperature range of -30°C to +75°C.

Service and repair

This controller has no user serviceable parts. Contact your nearest Eurotherm Controls agent for repair.

Caution: Charged capacitors

Before removing an instrument from its sleeve, disconnect the supply and wait at least two minutes to allow capacitors to discharge. In any case, avoid touching the exposed electronics of an instrument when withdrawing it from the sleeve. Failure to observe these precautions may cause damage to components of the instrument or some discomfort to the user.

Electrostatic discharge precautions

When the controller is removed from its sleeve, some of the exposed electronic components are vulnerable to damage by electrostatic discharge from someone handling the controller. To avoid this, before handling the unplugged controller discharge yourself to ground.

Cleaning

Do not use water or water based products to clean labels or they will become illegible. Isopropyl alcohol may be used to clean labels. A mild soap solution may be used to clean other exterior surfaces of the product.

Installation Safety Requirements

Safety symbols

Various symbols are used on the instrument, they have the following meaning:

Caution (Refer to the accompanying documents)

Functional earth (ground)

Protective earth terminal

The functional earth connection is not required for safety purposes but to ground RFI filters.

Personnel

Installation must only be carried out by qualified personnel.

Enclosure of live parts

To prevent hands or metal tools touching parts that may be electrically live, the controller must be installed in an enclosure.

Wiring

It is important to connect the controller in accordance with the wiring data given in this handbook. Take particular care not to connect AC supplies to the low voltage sensor input or other low level inputs and outputs. Only use copper conductors for connections, (except thermocouple). Ensure that the wiring of installations comply with all local wiring regulations. For example in the UK use the latest version of the IEE wiring regulations, (BS7671). In the USA use NEC Class 1 wiring methods.

Power isolation

The installation must include a power isolating switch or circuit breaker that disconnects all current carrying conductors. The device should be mounted in close proximity to the controller, within easy reach of the operator and marked as the disconnecting device for the instrument.

Earth leakage current

Due to RFI Filtering there is an earth leakage current of less than 2mA. This may affect the design of an installation of multiple controllers protected by Residual Current Device, (RCD) or Ground Fault Detector, (GFD) type circuit breakers.

Overcurrent protection

To protect the internal PCB tracking within the controller against excess currents, the AC power supply to the controller and power outputs must be wired through the fuse or circuit breaker specified in the technical specification.

Voltage rating

The maximum continuous voltage applied between any connection to ground must not exceed 264Vac.

The controller should not be wired to a three phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 264Vac with respect to ground and the product would not be safe.

Voltage transients across the power supply connections, and between the power supply and ground, must not exceed 2.5kV. Where occasional voltage transients over 2.5kV are expected or measured, the power installation to both the instrument supply and load circuits should include a transient limiting device.

These units will typically include gas discharge tubes and metal oxide varistors that limit and control voltage transients on the supply line due to lightning strikes or inductive load switching. Devices are available in a range of energy ratings and should be selected to suit conditions at the installation.

Conductive pollution

Electrically conductive pollution must be excluded from the cabinet in which the controller is mounted. For example, carbon dust is a form of electrically conductive pollution. To secure a suitable atmosphere, install an air filter to the air intake of the cabinet. Where condensation is likely, for example at low temperatures, include a thermostatically controlled heater in the cabinet.

Grounding of the temperature sensor shield

In some installations it is common practice to replace the temperature sensor while the controller is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.

Over-temperature protection

When designing any control system it is essential to consider what will happen if any part of the system should fail. In temperature control applications the primary danger is that the heating will remain constantly on. Apart from spoiling the product, this could damage any process machinery being controlled, or even cause a fire.

Reasons why the heating might remain constantly on include:

- the temperature sensor becoming detached from the process
- thermocouple wiring becoming short circuit;
- the controller failing with its heating output constantly on
- an external valve or contactor sticking in the heating condition
- the controller setpoint set too high.

Where damage or injury is possible, we recommend fitting a separate over-temperature protection unit, with an independent temperature sensor, which will isolate the heating circuit.

Please note that the alarm relays within the controller will not give protection under all failure conditions.

INSTALLATION REQUIREMENTS FOR EMC

To ensure compliance with the European EMC directive certain installation precautions are necessary as follows:

- For general guidance refer to Eurotherm Controls EMC Installation Guide, HA025464.
- Input cables for either of the main PV inputs, (T/C, R/T or linear) must be threaded through the ferrite ring supplied with the product. Loop the cables so there are three complete turns through the ring. Mount the ferrite ring as close as practical to the rear terminals, preferably inside the rear terminal cover. The Eurotherm part number of the ferrite ring is CO 025439.
- RT input types must use a screened cable to connect to the sensor. The screened cable should be connected to sleeve earth using the earth connection on the bottom of the instrument. It is recommended that the sensor end is also earthed.
- When using relay or triac outputs it may be necessary to fit a filter suitable for suppressing the conducted emissions. The filter requirements will depend on the type of load. For typical applications we recommend Schaffner FN321 or FN612.
- If the unit is used in table top equipment which is plugged into a standard power socket, then it is likely that compliance to the commercial and light industrial emissions standard is required. In this case to meet the conducted emissions requirement, a suitable mains filter should be installed. We recommend Schaffner types FN321 and FN612.

Routing of wires

To minimise the pick-up of electrical noise, the low voltage DC connections and the sensor input wiring should be routed away from high-current power cables. Where it is impractical to do this, use shielded cables with the shield grounded at both ends. In general keep cable lengths to a minimum.

Technical Specification

Environmental ratings

Panel sealing:	Instruments are intended to be panel mounted. The rating of panel sealing is IP65, (EN 60529), or 4X, (NEMA 250).
Operating temperature:	0 to 50°C for up to 4 modules, (45°C for 6 modules). Ensure the enclosure provides adequate ventilation.
Relative humidity:	5 to 95%, non condensing.
Atmosphere:	Not suitable for use above 2000m or in explosive or corrosive atmospheres.

Equipment ratings

Supply voltage / frequency:	100 to 240Vac -15%, +10% / 48 to 62Hz.
Power consumption:	20Watts maximum.
Relay (isolated):	Maximum: 264Vac, 2A resistive. Minimum: 5Vdc, 100mA.
Triac output (isolated):	85 to 264Vac. Maximum current: 0.75A resistive (Only two triac outputs are allowed per instrument).
Leakage current:	External 'snubber' components are supplied to suppress voltage spikes on triac and relay contact outputs. The leakage current through these components is less than 2mA at 264Vac, 50Hz.
Over current protection:	Use a minimum of 0.5mm^2 or 16awg wire for plant connections. External over current protection devices are required. Use independent fuses for the instrument supply and each relay or triac output. Suitable fuses are time-lag, (EN60127, type T) with ratings as follow; Instrument supply 2A; Relay outputs: 2A; Dual relay outputs, (fuse the common line) 3.15A; Triac outputs: 1A; Dual triac outputs (fuse the common line) 2A.
Low level i/o:	Input and output connections other than triac and relay are intended for low level signals less than 42V.
Logic output (isolated):	20V at 20mA.
DC output (isolated):	0 to 20mA (900Ω max),or 0 to 10V (500Ω min).
Analogue retrans. (isolated):	0 to 20mA (900Ω max), or -5 to 10V (500Ω min).
Digital communications:	EIA-232, or 4-wire EIA-422, (both isolated).

Electrical safety

Safety Standard:	Meets EN 61010, Installation category II, pollution degree 2. Voltage transients on any mains power connected to the instrument must not exceed 2.5kV. Electrically conductive pollution must be excluded from the cabinet in which the instrument is mounted.
Isolation:	The metal sleeve must be earthed. All inputs and outputs have reinforced insulation to provide protection against electric shock.

General

Main PV input range:	-20 to +100mV, or 0 to 10Vdc (auto ranging) and 3 wire Pt100.
Calibration accuracy:	The greater of ±0.1% of span, or ±1 LSD.
Cold junction compensation	>30:1 rejection of ambient temperature, (for thermocouple i/p).

Chapter 2

OPERATION

Contents Page

GENERAL

Operating Modes

The 900 EPC has two operating modes :

* Operator Mode :T he controller functions normally.
* Configuration Mode : The controller does not normally perform any control operations.

Adjustments to parameters in configuration mode should be made with great care, given that mistakes made in this mode could cause a malfunction of the controller. Configuration parameters may be viewed and the transfer from operator to configuration mode made via the keypad on the front panel of the instrument.

Access Levels

The 900 EPC instrument range have three access levels in operator mode :

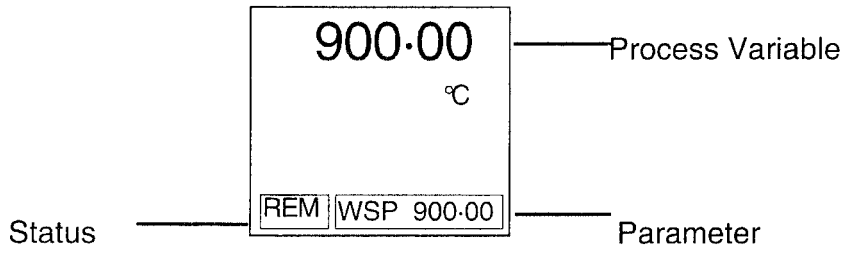
* Level 1 which is always available to the operator
* Levels 2 and 3 which are accessible via the entry of security codes. All parameters are available in level 3, and it is from this level that you can determine which parameters will be available in levels 1 and 2, whether they should be viewable only, or whether they may be both viewed and altered. Level 3 also allows access to the principal instrument screens to be limited. Note that the parameters displayed are dependent on the configuration of the instrument.

900 EPC Displays

The display used by the 900 EPC is provided by a dot matrix (80 x 64) device: because of this many different types of information displays can be provided: numeric data, textual displays and messages, bar graphs, program profiles, and customised screens. At power up, the following 'sign on' screen is displayed for approximately 4 seconds:

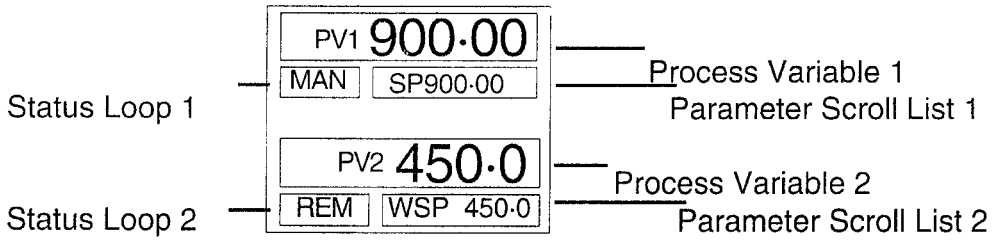
Next appears a screen on which is displayed the measured value or process variable, the status of the instrument (remote setpoint, alarm mode, auto/manual) and access to the 'scroll list', which is a list of instrument and control parameters.

Single Loop Controller

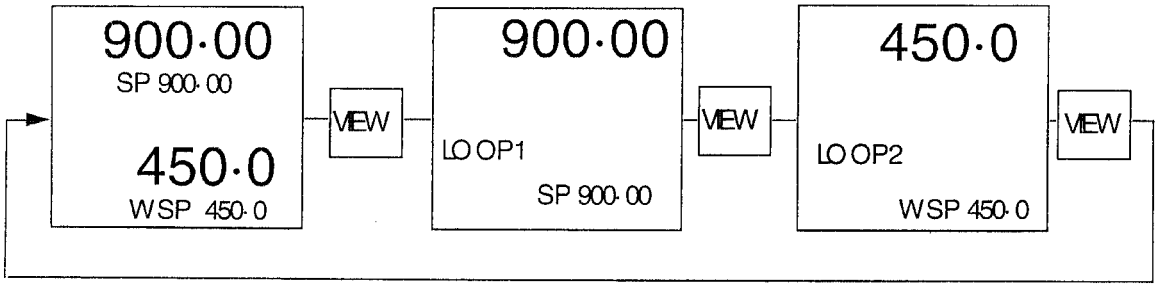


On this screen it is possible to view the values of the different instrument parameters, using the ▲ key, and also to change them (providing that changes have been authorised from access level 3).

Dual Loop Controller



This screen does not allow any changes to parameters to be made. To access parameters from either of the loops, you will need to press the VIEW key.



Subsequently pressing PAGE will allow you to access the instrument main menu (see flow charts later in the chapter).

KEYPAD

All configuration and control operations can be performed using the 6 keys on the front panel of the instrument. The principal functions are available in the various menus accessible via the PAGE key; parameters may be located in the scroll list using the key and selected using (VIEW) .

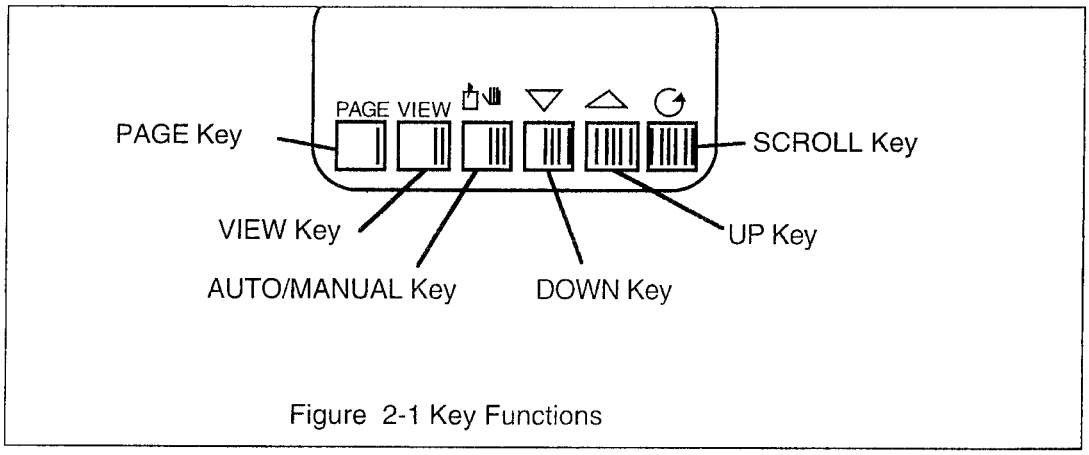


Figure 2-1 Key Functions

KEY FUNCTIONS

PAGE — Selection of the next menu, or return to the previous menu following another type of operation

(VIEW) — Access to the currently highlighted menu option or parameter

Transfer from Auto to Manual mode (or vice versa)

Decreases the value of the currently selected parameter

Increases the value of the currently selected parameter

Move to the next parameter or the next menu (moves the highlighted 'cursor'

+ Move to the previous parameter

PAGE + ▽ Fast decrease in the value of the currently selected parameter

PAGE + △ Fast increase in the value of the currently selected parameter

FUNDAMENTAL OPERATIONS

Parameter Access

* Press the ⟳ key: the next parameter will be displayed in place of the preceding one, or the next parameter or option will be highlighted.

Changing Parameters

* When the parameter is displayed (displayed on its own or highlighted), press either △ (increase) or ▽ (decrease).

Selecting a Menu

* Press PAGE until the name of the menu that you are looking for is displayed.
* Press VIEW in order to view the contents of the menu.

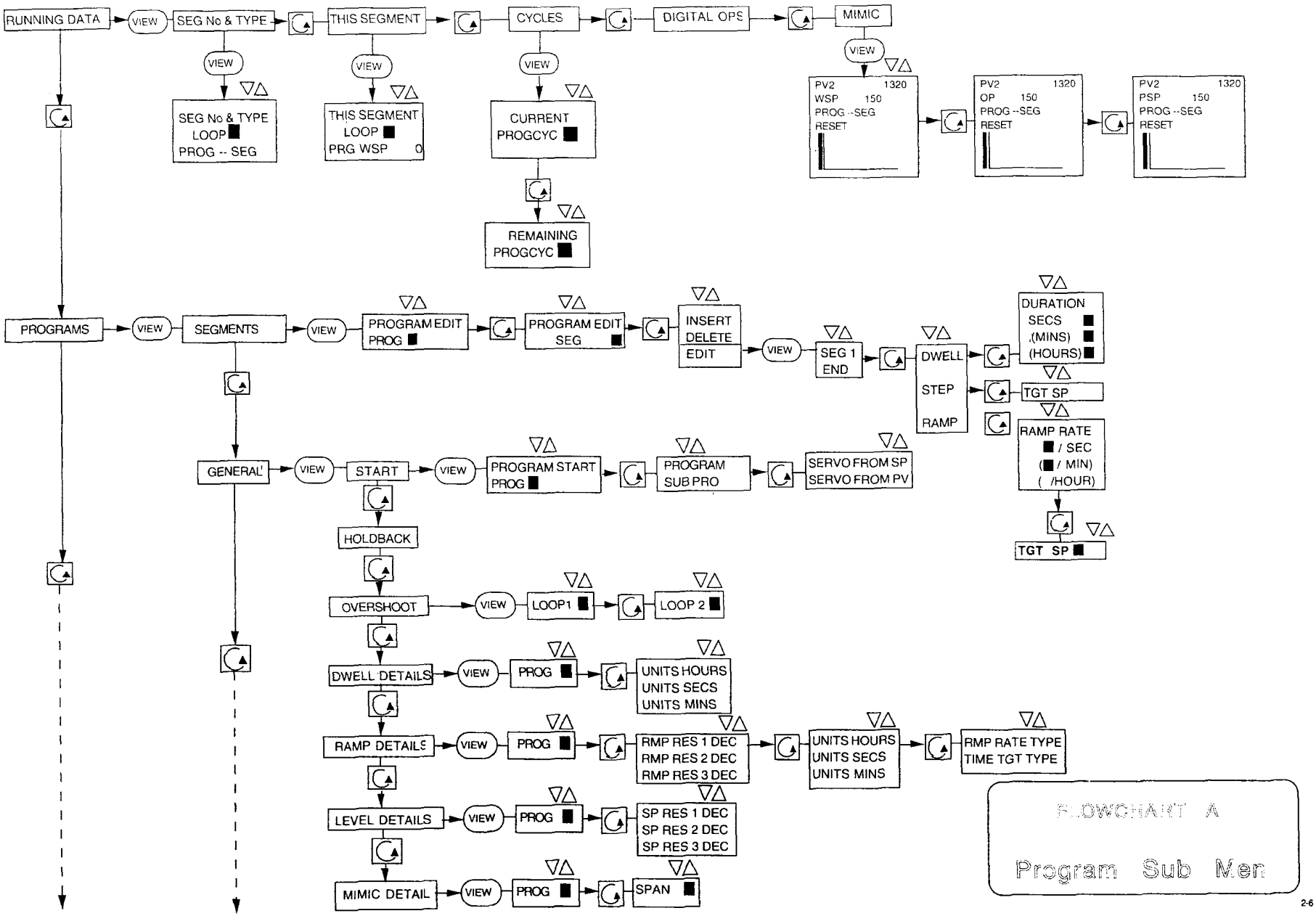
Selecting a Sub-Menu

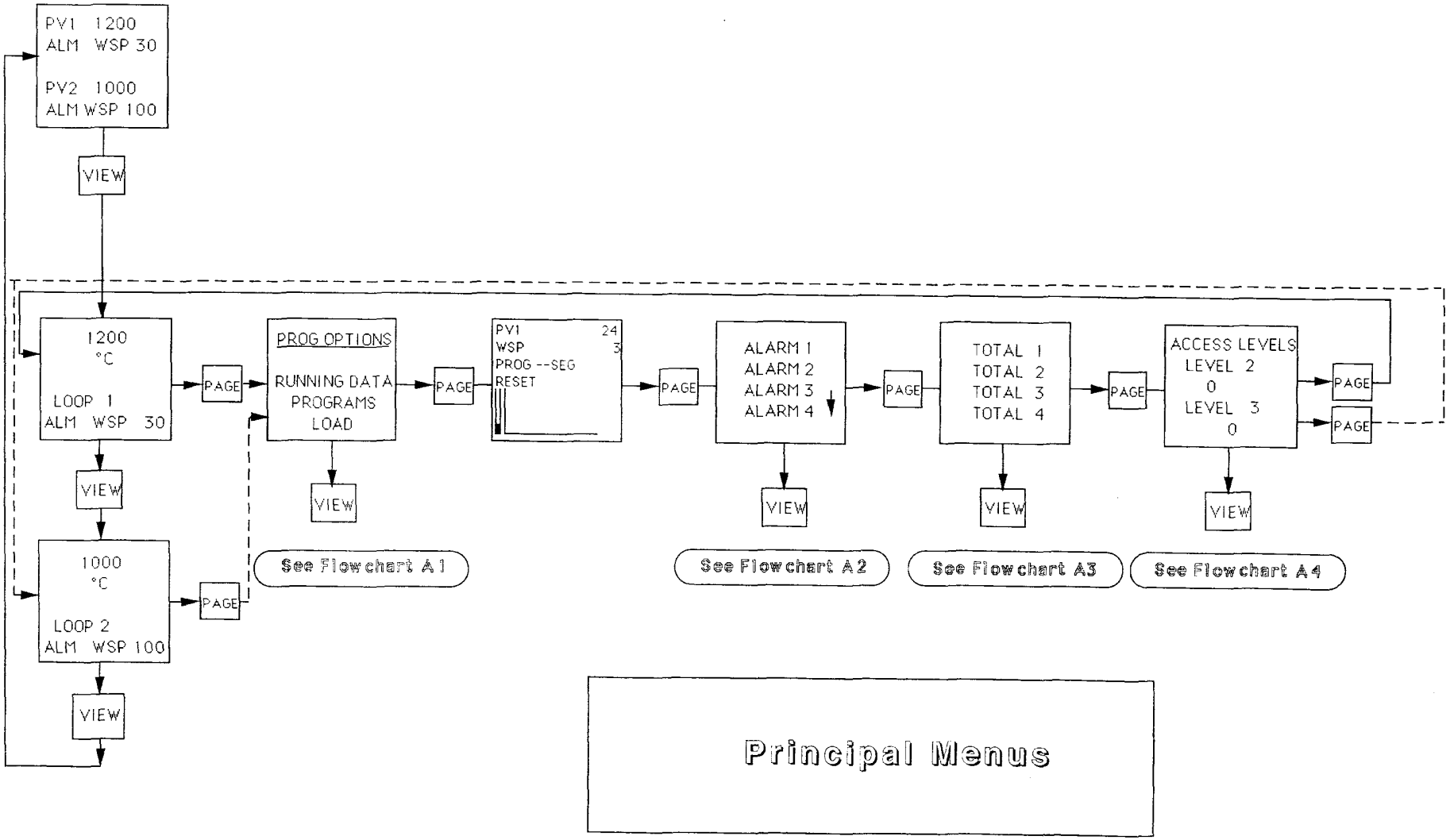
* Press ⟳ until the name of the sub-menu is highlighted.
* Press VIEW to view the contents of the menu.

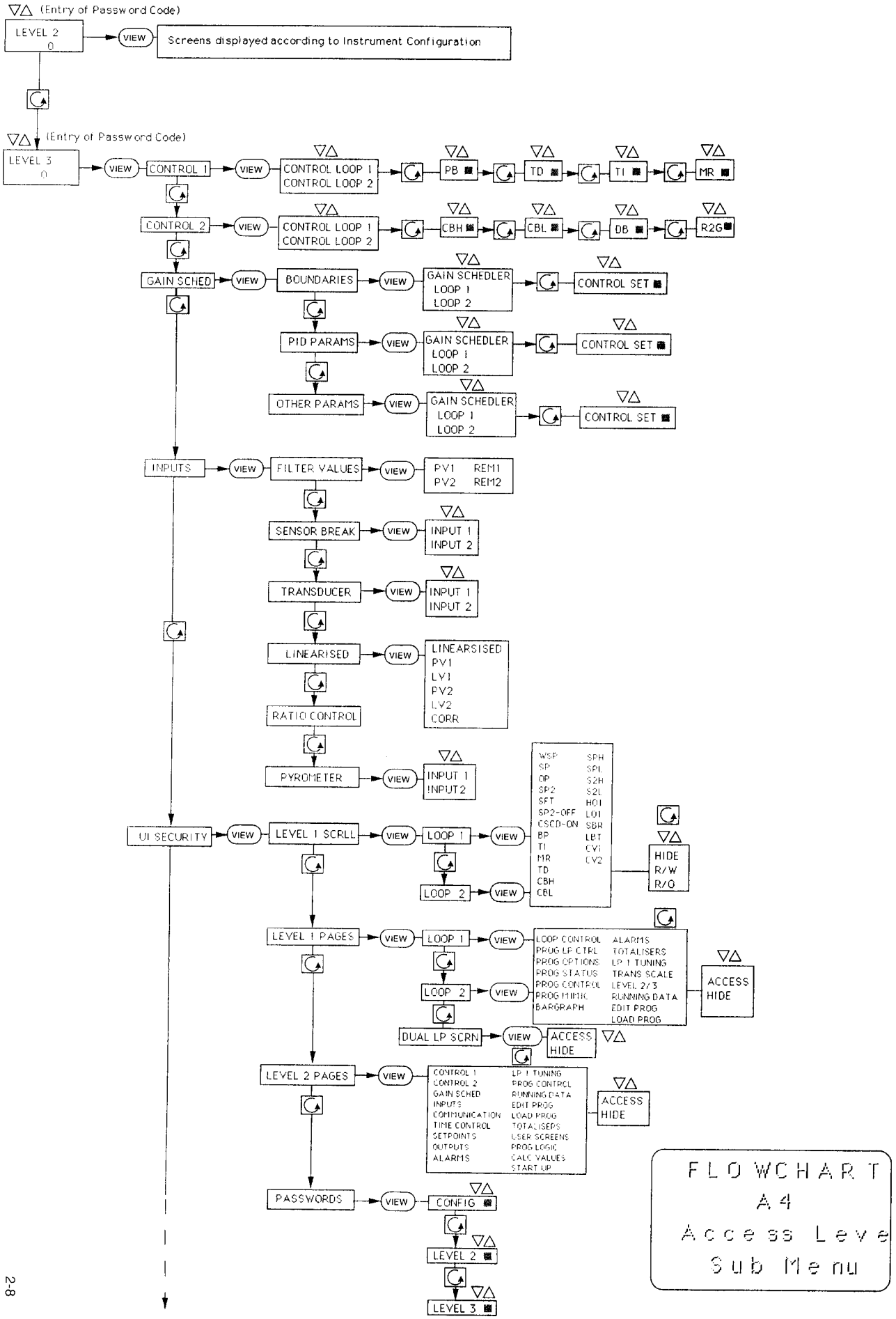
Returning to a Sub-Menu or the Main Screen

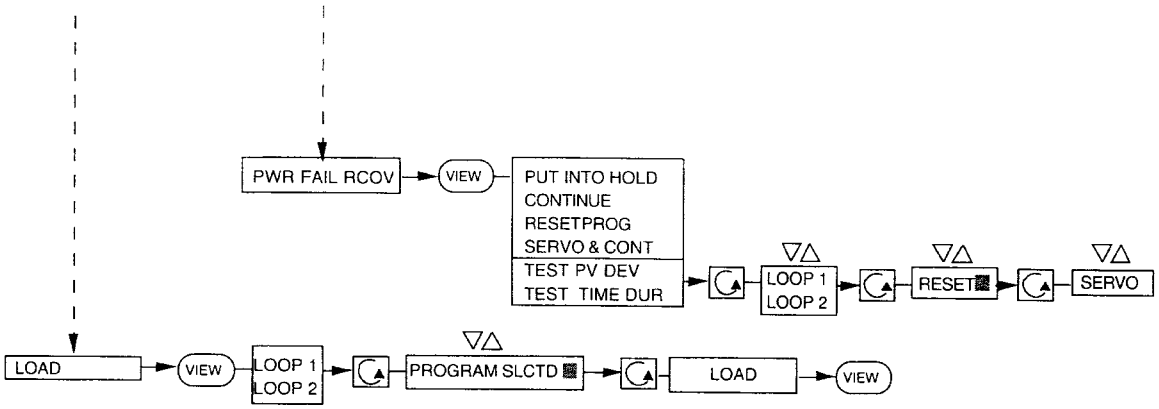
* Return to a preceding Sub-Menu or the Main-Menu
* Press PAGE

The meaning of the Arrow at the Bottom Left of the Screen
This arrow indicates that the list on this screen is continued on the next screen. To transfer to this second screen, press ⟳ when the last message (at the base of the page) is highlighted.

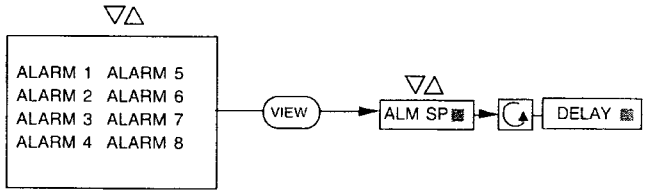

RUNNING DATA
VIEW
SEG No & TYPE
THIS SEGMENT
CYCLES
DIGITAL OPS
MIMIC
SEG No & TYPE
LOOP
PROG -- SEG
THIS SEGMENT
LOOP
PRG WSP 0
CURRENT
PROGCYC
REMAINING
PROGCYC
PV2 1320
WSP 150
PROG --SEG
RESET
PV2 1320
OP 150
PROG --SEG
RESET
PV2 1320
PSP 150
PROG --SEG
RESET
PROGRAMS
SEGMENTS
PROGRAM EDIT
PROG
PROGRAM EDIT
SEG
INSERT
DELETE
EDIT
SEG 1
END
DWELL
STEP
RAMP
DURATION
SECS
(MINS)
(HOURS)
TGT SP
RAMP RATE
/ SEC
(/ MIN)
(/HOUR)
TGT SP
GENERAL
START
PROGRAM START
PROG
PROGRAM
SUB PRO
SERVO FROM SP
SERVO FROM PV
HOLDBACK
OVERSHOOT
LOOP1
LOOP 2
DWELL DETAILS
PROG
UNITS HOURS
UNITS SECS
UNITS MINS
RAMP DETAILS
PROG
RMP RES 1 DEC
RMP RES 2 DEC
RMP RES 3 DEC
UNITS HOURS
UNITS SECS
UNITS MINS
RMP RATE TYPE
TIME TGT TYPE
LEVEL DETAILS
PROG
SP RES 1 DEC
SP RES 2 DEC
SP RES 3 DEC
MIMIC DETAIL
PROG
SPAN
FLOWCHART A
Program Sub Men


PV1 1200
ALM WSP 30
PV2 1000
ALM WSP 100
VIEW
1200
°C
LOOP 1
ALM WSP 30
PAGE
VIEW
1000
°C
LOOP 2
ALM WSP 100
PAGE
VIEW
PROG OPTIONS
RUNNING DATA
PROGRAMS
LOAD
PAGE
VIEW
See Flowchart A1
PV1 24
WSP 3
PROG --SEG
RESET
PAGE
ALARM 1
ALARM 2
ALARM 3
ALARM 4
PAGE
VIEW
See Flowchart A2
TOTAL 1
TOTAL 2
TOTAL 3
TOTAL 4
PAGE
VIEW
See Flowchart A3
ACCESS LEVELS
LEVEL 2
0
LEVEL 3
0
PAGE
PAGE
VIEW
See Flowchart A4
Principal Menus

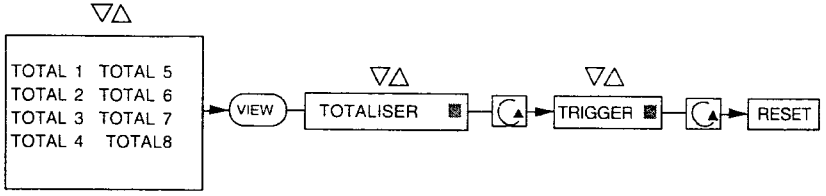

(Entry of Password Code)
LEVEL 2
0
VIEW
Screens displayed according to Instrument Configuration
(Entry of Password Code)
LEVEL 3
0
CONTROL 1
CONTROL LOOP 1
CONTROL LOOP 2
PB
TD
TI
MR
CONTROL 2
CBH
CBL
DB
R2G
GAIN SCHED
BOUNDARIES
GAIN SCHEDLER
LOOP 1
LOOP 2
CONTROL SET
PID PARAMS
OTHER PARAMS
INPUTS
FILTER VALUES
PV1 REM1
PV2 REM2
SENSOR BREAK
INPUT 1
INPUT 2
TRANSDUCER
LINEARISED
LINEARSISED
PV1
LV1
PV2
LV2
CORR
RATIO CONTROL
PYROMETER
UI SECURITY
LEVEL 1 SCRLL
LOOP 1
LOOP 2
WSP SPH
SP SPL
OP S2H
SP2 S2L
SFT HO1
SP2-OFF LO1
CSCD-ON SBR
BP LBT
TI CV1
MR CV2
TD
CBH
CBL
HIDE
R/W
R/O
LEVEL 1 PAGES
LOOP CONTROL ALARMS
PROG LP CTRL TOTALISERS
PROG OPTIONS LP 1 TUNING
PROG STATUS TRANS SCALE
PROG CONTROL LEVEL 2/3
PROG MIMIC RUNNING DATA
BARGRAPH EDIT PROG
LOAD PROG
ACCESS
HIDE
DUAL LP SCRN
ACCESS
HIDE
LEVEL 2 PAGES
CONTROL 1 LP 1 TUNING
CONTROL 2 PROG CONTROL
GAIN SCHED RUNNING DATA
INPUTS EDIT PROG
COMMUNICATION LOAD PROG
TIME CONTROL TOTALISERS
SETPOINTS USER SCREENS
OUTPUTS PROG LOGIC
ALARMS CALC VALUES
START UP
ACCESS
HIDE
PASSWORDS
CONFIG
LEVEL 2
LEVEL 3
FLOWCHART
A4
Access Level
Sub Menu



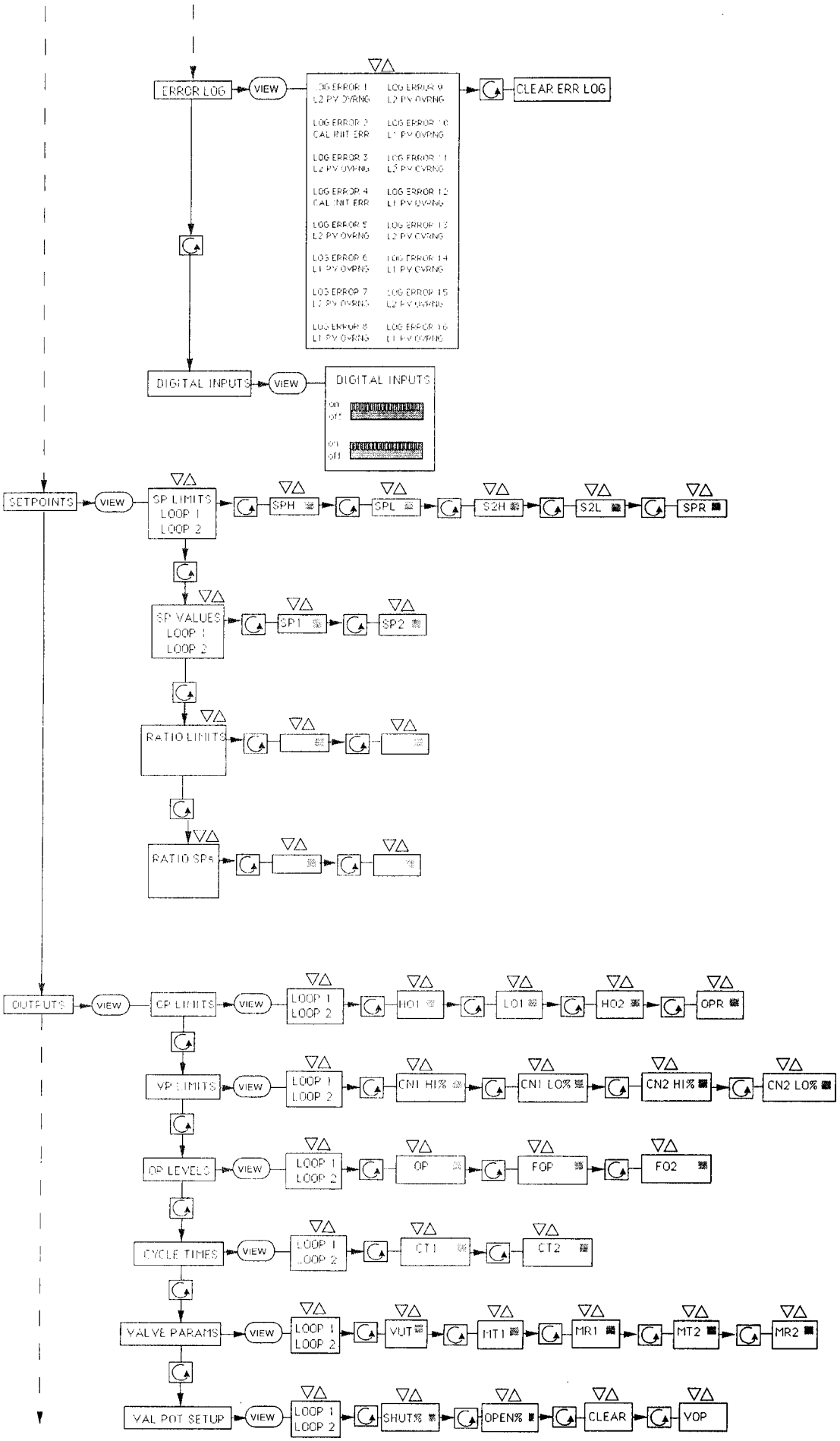
FLOWCHART A1 *(CONT)*

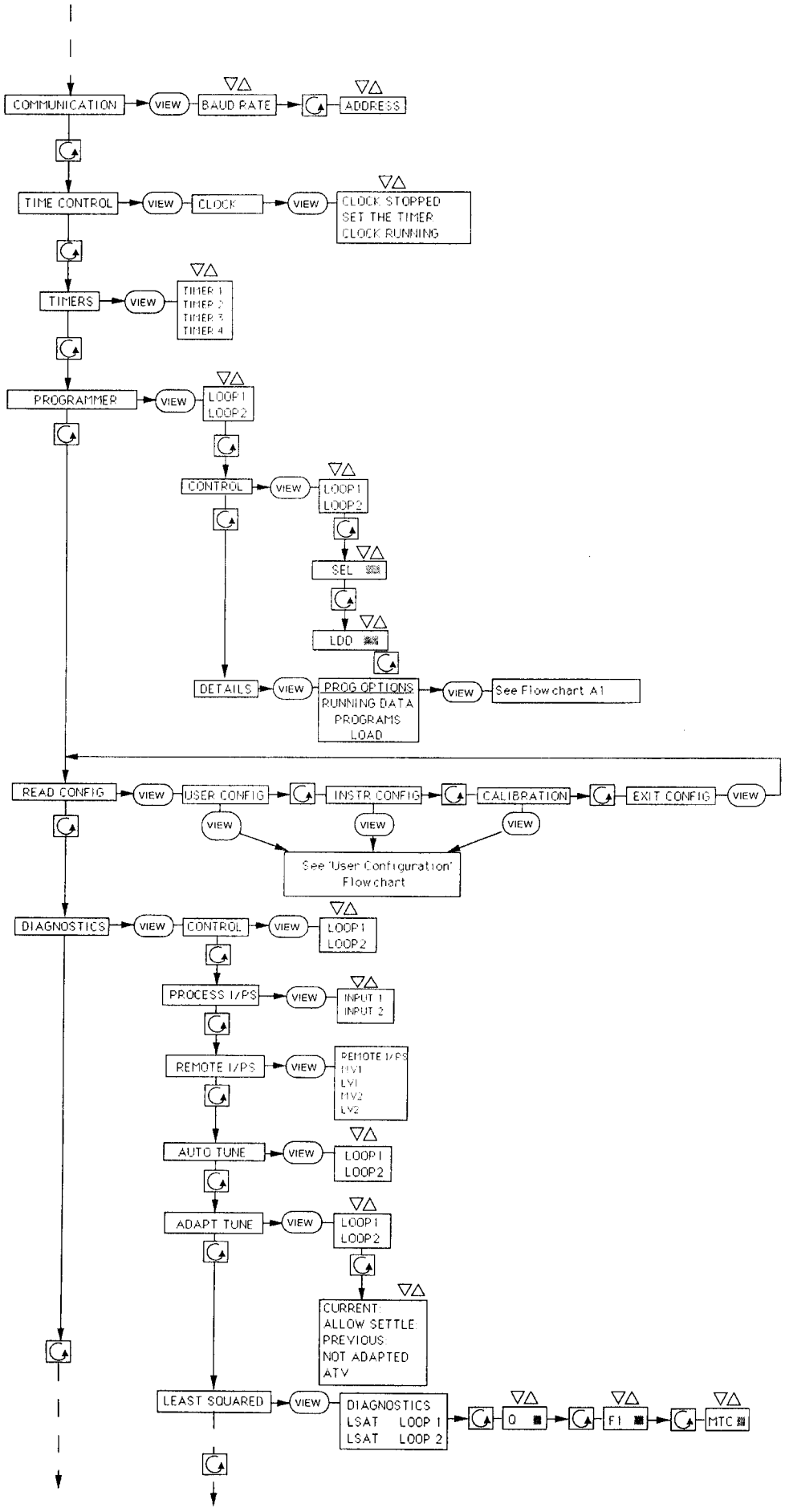


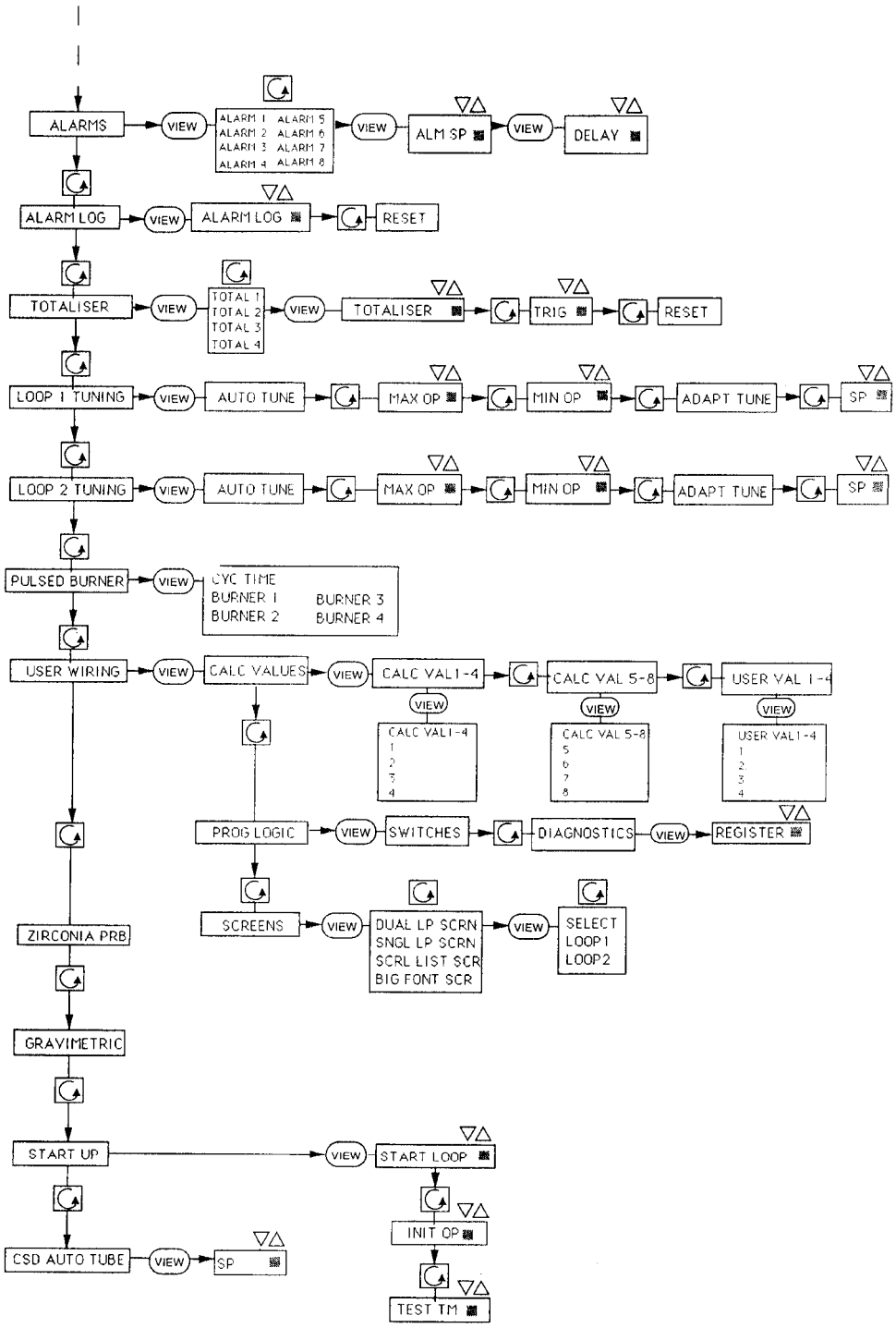
FLOWCHART A2
Alarms Sub Menu



FLOWCHART A3
Totalisers Sub Menu


ERROR LOG
VIEW
CLEAR ERR LOG
DIGITAL INPUTS
VIEW
DIGITAL INPUTS
SETPOINTS
VIEW
SP LIMITS
LOOP 1
LOOP 2
SPH
SPL
S2H
S2L
SPR
SP VALUES
LOOP 1
LOOP 2
SP1
SP2
RATIO LIMITS
RATIO SPs
OUTPUTS
VIEW
OP LIMITS
VIEW
LOOP 1
LOOP 2
HO1
LO1
HO2
OPR
VP LIMITS
VIEW
LOOP 1
LOOP 2
CN1 HI%
CN1 LO%
CN2 HI%
CN2 LO%
OP LEVELS
VIEW
LOOP 1
LOOP 2
OP
FOP
FO2
CYCLE TIMES
VIEW
LOOP 1
LOOP 2
CT1
CT2
VALVE PARAMS
VIEW
LOOP 1
LOOP 2
VUT
MT1
MR1
MT2
MR2
VAL POT SETUP
VIEW
LOOP 1
LOOP 2
SHUT%
OPEN%
CLEAR
VOP


COMMUNICATION
VIEW
BAUD RATE
ADDRESS
TIME CONTROL
VIEW
CLOCK
VIEW
CLOCK STOPPED
SET THE TIMER
CLOCK RUNNING
TIMERS
VIEW
TIMER 1
TIMER 2
TIMER 3
TIMER 4
PROGRAMMER
VIEW
LOOP 1
LOOP 2
CONTROL
VIEW
LOOP 1
LOOP 2
SEL
LDD
DETAILS
VIEW
PROG OPTIONS
RUNNING DATA
PROGRAMS
LOAD
VIEW
See Flowchart A1
READ CONFIG
VIEW
USER CONFIG
INSTR CONFIG
CALIBRATION
EXIT CONFIG
VIEW
VIEW
VIEW
VIEW
See 'User Configuration' Flowchart
DIAGNOSTICS
VIEW
CONTROL
VIEW
LOOP 1
LOOP 2
PROCESS I/PS
VIEW
INPUT 1
INPUT 2
REMOTE I/PS
VIEW
REMOTE I/PS
MV1
LV1
MV2
LV2
AUTO TUNE
VIEW
LOOP 1
LOOP 2
ADAPT TUNE
VIEW
LOOP 1
LOOP 2
CURRENT:
ALLOW SETTLE
PREVIOUS:
NOT ADAPTED
ATV
LEAST SQUARED
VIEW
DIAGNOSTICS
LSAT LOOP 1
LSAT LOOP 2
0
F1
MTC


ALARMS
VIEW
ALARM 1 ALARM 5
ALARM 2 ALARM 6
ALARM 3 ALARM 7
ALARM 4 ALARM 8
VIEW
ALM SP
VIEW
DELAY
ALARM LOG
VIEW
ALARM LOG
RESET
TOTALISER
VIEW
TOTAL 1
TOTAL 2
TOTAL 3
TOTAL 4
VIEW
TOTALISER
TRIG
RESET
LOOP 1 TUNING
VIEW
AUTO TUNE
MAX OP
MIN OP
ADAPT TUNE
SP
LOOP 2 TUNING
VIEW
AUTO TUNE
MAX OP
MIN OP
ADAPT TUNE
SP
PULSED BURNER
VIEW
CYC TIME
BURNER 1
BURNER 2
BURNER 3
BURNER 4
USER WIRING
VIEW
CALC VALUES
VIEW
CALC VAL1-4
CALC VAL 5-8
USER VAL 1-4
VIEW
CALC VAL1-4
1
2
3
4
VIEW
CALC VAL 5-8
5
6
7
8
VIEW
USER VAL1-4
1
2
3
4
PROG LOGIC
VIEW
SWITCHES
DIAGNOSTICS
VIEW
REGISTER
SCREENS
VIEW
DUAL LP SCRN
SNGL LP SCRN
SCRL LIST SCR
BIG FONT SCR
VIEW
SELECT
LOOP1
LOOP2
ZIRCONIA PRB
GRAVIMETRIC
START UP
VIEW
START LOOP
INIT OP
TEST TM
CSD AUTO TUBE
VIEW
SP

AUTO/MANUAL MODE

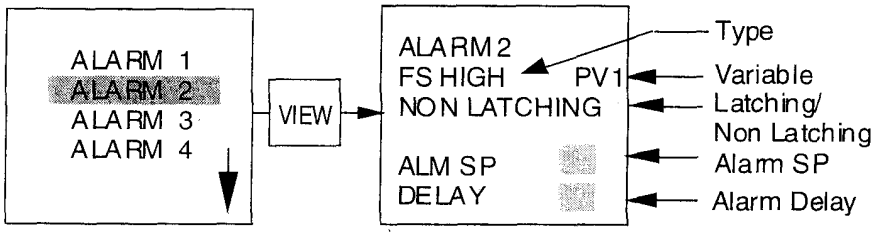
The transfer from auto to manual operating mode may be performed by either the , key, or by a digital input, depending on the configuration.
When manual mode is selected, the legend 'MAN' is displayed on the front panel. The 900 EPC no longer controls the process and the output power applied may be set with the △ or ▽ keys, or may take a pre-defined value (FOP). The key is used to return to auto mode.

IMPORTANT: Manual mode may not be selected using , from the dual loop screen.

ALARMS

General

The 900 EPC has 8 independent alarms which may be configured in any of 8 different ways.
The 'ALARM' menu (always available in level 3, and may be made available in levels 1 and 2) gives full information on all configured alarms.



- The type (high or low full scale, high or low deviation, band alarm, etc).
- The variable monitored by the alarm (Measured [process] Value, Output Power, Remote Setpoint, etc).
- Whether the alarm is latching or non-latching.
- The alarm setpoint (which may be altered).
- The alarm delay (which may be altered).

Setting the Alarm Setpoint

* From the above screen, select ALM SP and press either the △ or ▽ keys to set the value required.

Alarm Acknowledgement

* Whenever an alarm is active, the message 'ALM' is displayed in the status area of all main menus, replacing all other status indications unless manual mode is selected when 'MAN' is displayed.

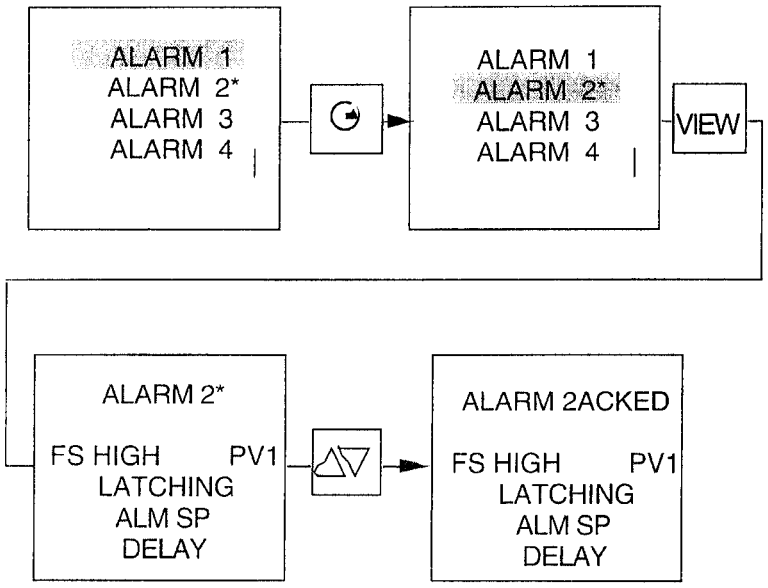
On the Alarm menu itself, the active alarms are indicated by an asterix.

Non Latching Alarms

These alarms are automatically acknowledged when the variable being monitored is no longer causing an alarm condition.

Latching Alarms

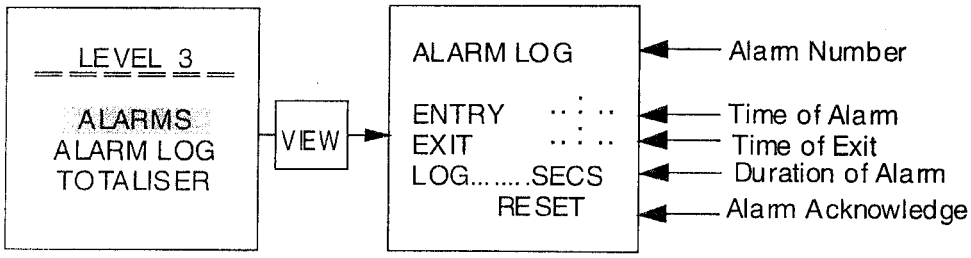
* To acknowledge these, select the active alarm (indicated by *)
* Press △ and ▽ simultaneously .



* The ALM message will be removed from the display once the alarm has been acknowledged and the variable monitored is no longer causing an alarm condition.

Detailed Information on Alarms

The 'ALARM LOG' menu available in level 3 allows you to view:
The time at which each alarm was triggered, the time that it was acknowledged, the length time (in seconds) that the alarm was active, and whether the alarm has been acknowledged.



CONTROL SETPOINT

Working Setpoint

The working setpoint, WSP, is the setpoint that is used for control, and may be derived from either the primary setpoint, SP, the secondary setpoint, SP2, or a remote setpoint (if the controller has been configured to allow this). The Working Setpoint is displayed on most of the level 1 screen displays.

Changing the Working Setpoint Value

The working setpoint may usually be directly changed (when WSP is displayed). However, in the following cases: Setpoint Ramp, Remote Setpoint, Mathematical Functions, you will need to locate the source setpoint and change that.

Direct access

* Access WSP :
  - From the main screen (see page) if changes to the parameter have been permitted in level 3.
  - Otherwise, enter level 3 and select WSP from the sub-menu SP VALUES from the SETPOINTS menu.
  - Use the △ and ▽ keys to change the value.

Indirect Access

* Firstly access the source setpoint that is being used :
  - From the main screen (see page) if changes to the parameter have been authorised in level 3.
  - Otherwise, enter level 3 and select the sub-menu SP VALUES from the SETPOINTS menu.
* Display the parameter that corresponds to the working setpoint using [C▲] :
  - SP or SP1 : Primary Setpoint
  - SP2 : Secondary Setpoint
* Use the △ and ▽ keys to change the value
* After 10 seconds, the main screen will appear with the new value taken into account. To return immediately to the main screen from the SETPOINTS menu, press PAGE three times.

Changing the Source of the Working Setpoint

The source parameter for the Working Setpoint can be selected via a digital input (see Chapter 5) or via the scroll list on the main screen, in which case you should follow one of the these procedures :

Selecting the Secondary Internal Setpoint (SP2)

* Press [C▲] until SP2 - OFF is displayed
* Press either △ or ▽ in order to display SP2 - ON

The working setpoint will take the value of SP2 after 10 seconds.

Selecting the Remote Setpoint

* Press [C] until LOCAL is displayed
* Press either △ or ▽ to display REMOTE

After 10 seconds REM will be displayed in the status area of the main screen.

Selecting the Primary Internal Setpoint (SP1)

These are two possible situations :
If the working setpoint is currently SP2:

* Press [C] until SP2 - ON is displayed
* Press either △ or ▽ in order to display SP2 - OFF

The working setpoint will take the value of SP after 10 seconds.
If the working setpoint is set to be the remote setpoint:

* Press [C] until REMOTE is displayed
* Press either △ or ▽ to display LOCAL

Setpoint Ramps

Selecting a Ramp

Providing that the function has been selected in configuration mode, all 900 EPC controllers allow you use of Setpoint Ramps.
Setpoint Ramping may be selected vai a digital input, provided that the instrument has been configured to allow this or via the scroll list on the main screen in which case you should use the following procedure:

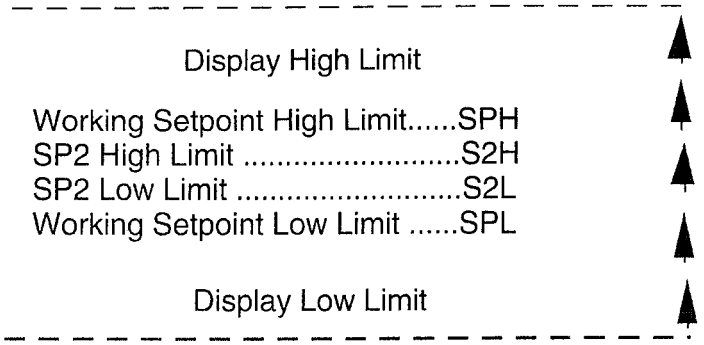
* Press [C] until SRL - OFF is displayed
* Press either △ or ▽ to display SRL - ON

After 10 seconds the main screen will be displayed and the working setpoint will start ramping to the desired value.

Setting the Ramp Rate

* From the main screen press [C] until SPR is displayed.
* Press either △ or ▽ to set the value required in units/minute or per hour according to the configuration of the instrument.

Setpoint Limits



You may set the high and low limits of the working setpoint WSP: the high limit is SPH and the low limit is SPL. These limits are bounded by the maximum display range of the instrument. The secondary setpoint, SP2, has independant limits which are bounded by the limits of WSP, SPL and SPH:

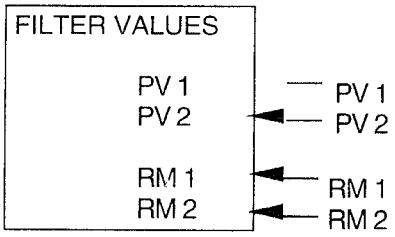
Display the SBR parameter:

* You may change the setpoint limits from the main screen providing changes have been permitted, using [C] select SPL, SPH, S2L or S2H.
* Alternatively, enter level 3 and go to the LIMITS sub-menu of the SETPOINTS menu. Then select the required limit.
* Change the value of the limit using △ or ▽

MEASURED VALUE INPUT

Power applied if Sensor Break detected

* Display the SBR parameter:
  - From the main screen providing changes have been permitted using [C]
  - Otherwise, enter level 3 and go to the SENSOR BREAK sub-menu of the INPUT menu. For dual loop controllers, select the input 1 or 2 (INPUT 1 or INPUT 2) using △ or ▽. Then select SBR .
* Change the value of SBR using △ or ▽.



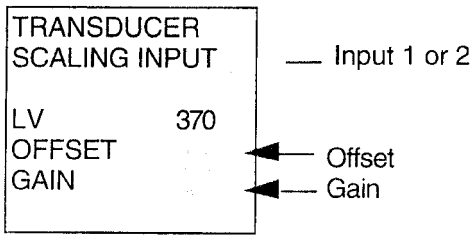
Input Filtering

* In level 3 select the sub-menu FILTER VALUES from the INPUTS menu.

*Use [C] to select the variable concerned (PV1 for input 1, PV2 for input 2, REM1 remote setpoint, REM2 remote setpoint loop 2.

* Using △ or ▽ change the filter value between 0.0 and 3600.0 seconds.

Transducers

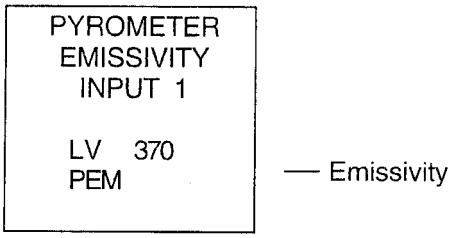


* In level 3 go to the TRANSDUCER sub-menu of the INPUTS menu.

* Use [C] to highlight the input concerned, and select it using △ or ▽.

* Select OFFSET with [C] and adjust it using △ or ▽ (in the range -1000.0 and + 1000.0).

* Select GAIN with [C] and change the value with △ or ▽ (in the range 0.001 to + 99.999%).



Pyrometers

* To set the emissivity select level 3 and go to the sub-menu PYROMETER of the INPUTS menu.

* Select PEM using [C]

* Use △ or ▽ to change the value (in the range 0.01 and 1.00)

LIST OF PARAMETERS IN OPERATOR MODE

This list gives all the parameters available in the 900 EPC controller range. Note that certain parameters may not appear in your instrument depending on the configuration. Only parameters relevant to your application will be displayed.

ATV ..... Adaptive tune trigger level

CAS ..... Cascade
CBH ..... Cutback High
CBL ..... Cutback Low
CSCD ON/OFF ..... Cascade function on/off
CT1 ..... Cycle Time Output 1
CT2 ..... Cycle Time Output 2
CV1 ..... Calculated Value 1
CV2 ..... Calculated Value 2
CV3 ..... Calculated Value 3
CV4 ..... Calculated Value 4
CV5 ..... Calculated Value 5
CV6 ..... Calculated Value 6
CV7 ..... Calculated Value 7
CV8 ..... Calculated Value 8

DB ..... Dead Band
DB1 ..... Dead Band 1
DB2 ..... Dead Band 2

FOP ..... Forced Output Power in Manual

HO1 ..... Output Power High Limit, Channel 1
HO2 ..... Output Power High Limit, Channel 2

LBT ..... Loop Break Time
LST ..... Local Setpoint Trim
LO1 ..... Output Power Low Limit, Channel 1
LO2 ..... Output Power Low Limit, Channel 2
LOCAL ..... Internal Setpoint Selection
LST ..... Local Setpoint Trim
LV1 ..... Valve Position Lower Limit, Channel 1
LV2 ..... Valve Position Lower Limit, Channel 2

MR ..... Master Reset
MR1 ..... Minimum Response Time, Channel 1
MR2 ..... Minimum Response Time, Channel 2
MRT ..... Minimum Response Time
MT1 ..... VP Travel Time Channel 1
MT2 ..... VP Travel Time Channel 2
MTC ..... Pulse Burner Minimum ON Time
MTT ..... VP Travel Time

NORMAL STANDBY .... Normal or Standby Mode Selection

OP ..... Output Power
OP1 ..... Output Power, Channel 1
OP2 ..... Output Power, Channel 2
OPR ..... Output Power Rate Limit
ORL ..... Output Power Rate Limit Function Selection
OSB ..... Output Power in Sensor Break
OT1 ..... Pulse Burner 1 ON Time
OT2 ..... Pulse Burner 2 ON Time
OT3 ..... Pulse Burner 3 ON Time
OT4 ..... Pulse Burner 4 ON Time
OT5 ..... Pulse Burner 5 ON Time
OT6 ..... Pulse Burner 6 ON Time
OT7 ..... Pulse Burner 7 ON Time
OT8 ..... Pulse Burner 8 ON Time
PB ..... Proportional Band
PEM ..... Pyrometer Emissivity
PID ..... Gain Scheuling Set to use
PIDH ..... High Power Limit for active PID set
PIDL ..... Low Power Limit for active PID set

R2G ..... Relative Cool Gain Channel 2
RA2 ..... Ratio Setpoint 2
RA2 ON/OFF ..... Selection of Ratio Setpoint 2
RAB ..... Ratio Setpoint Offset
RAH ..... Ratio Setpoint High Limit
RAI ..... Ratio Setpoint
RAL ..... Ratio Setpoint Low Limit
RATIO ON/OFF ..... Ratio Function On/Off
REMOTE /LOCAL ..... External or Local Setpoint selection
RHP ..... Remote Power High Limit
RPV ..... Maximum Output Power Level for Channel 1 in Manual Mode
RRT ..... Ratio Setpoint Trim
RSB ..... Remote Sensor Break

RSP ..... Remote Setpoint
RST ..... External Setpoint Trim

S2H ..... Setpoint 2 High Limit
S2L ..... Setpoint 2 Low Limit
SBR ..... Output Power in Sensor Break
SFT ..... Setpoint Feedforward Trim
SP ..... Internal Setpoint 1
SP2 ..... Internal Setpoint 2
SP2 ON/OFF ..... Setpoint 2 Selection
SPH ..... Setpoint 2 High Limit
SPL ..... Setpoint 2 Low Limit
SPR ..... Setpoint Rate Limit
SLR ON/OFF ..... Setpoint Rate Limit Function ON/OFF
SVN ..... Software Version Number
SW1 ..... Switch 1
SW2 ..... Switch 2
SW3 ..... Switch 3
SW4 ..... Switch 4

TD ..... Derivative Time
TI ..... Integral Time
TIMER ON/OFF ..... Timer Functions ON/OFF

UV1 ..... User Value 1
UV2 ..... User Value 2
UV3 ..... User Value 3
UV4 ..... User Value 4

VB2 ..... Valve Position in Sensor Break, Channel 2
VBP ..... Valve Position in Sensor Break, Channel 1
VH1 ..... Valve Position Upper Limit, Channel 1
VH2 ..... Valve Position Upper Limit, Channel 2
VP1 ..... Valve Position, Channel 1
VP2 ..... Valve Position, Channel 2
VPF ..... Valve Position
VUT ..... Valve Position Update Time

WSP ..... Working Setpoint

Chapter 3

ACCESS LEVELS

Contents Page

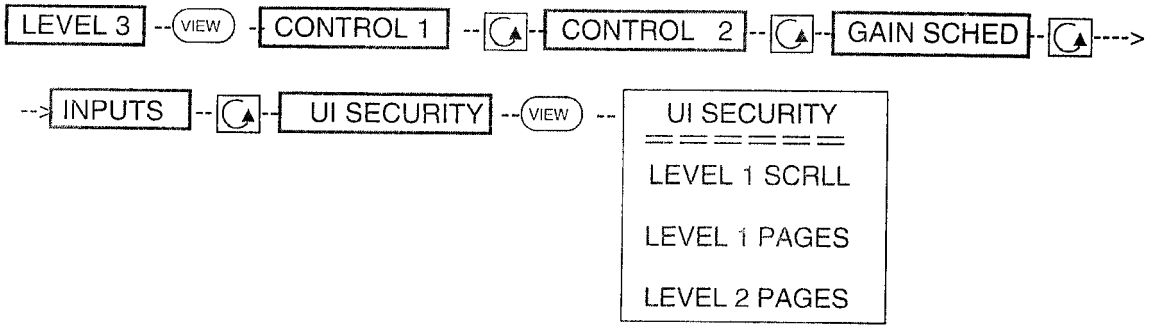
GENERAL

The 900 EPC Controller allows you to define which parameters are to be made available to the operator. To allow this, three access levels (1, 2 and 3) are available in the operator mode of the instrument.
Level 1 essentially provides access to the main screens (see 2.IIII) and the principal control parameters (measured value, setpoint, output power).
Level 2 gives access to nearly all the Level 3 menus except those used to define the parameters available in each level (UI SECURITY), viewing of the configuration of the instrument (READ CONFIG), the instrument diagnostics (DIAGNOSTICS), the alarm log (ALARM LOG), and the triggering of tuning algorithms.
Level 3 contains all parameters available in the instrument. It is in level 3 that the user may choose which parameters are to be available in levels 1 and 2. The transfer from one level to another requires the entry of a secret 'password' code.

Note : All Controllers are factory configured with the passwords set to '0'. To simplify the commissioning of your installation, all principal operating parameters are initially available in level 1.

ASSIGNMENT OF PARAMETERS TO DIFFERENT ACCESS LEVELS

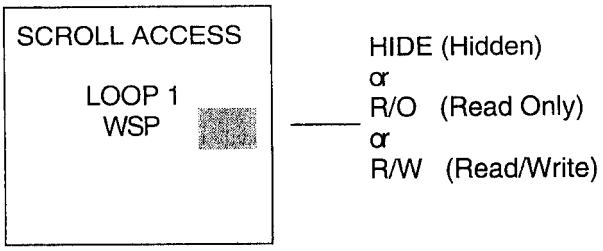
* In operator mode , select LEVEL 3 from the ACCESS LEVEL menu.
* Refer to the flow charts and follow the route shown below:



a- The first sub-menu 'LEVEL 1 SCRLL' should now be selected (highlighted). Press the (VIEW) key.

b- Select Loop 1

c- Next press (VIEW) , to access the first parameter, which you can hide (HIDE), set to read/write access (R/W), or read-only (R/O) , in level 1. To perform this operation, press △ or ▽ to select the option required.



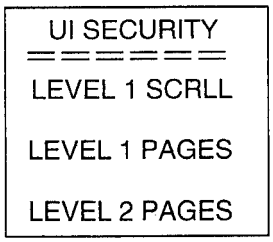
d- To move on to the next parameter, press ⟳.

e- Set the access using △ or ▽.

f- Once all the parameters have been assigned, return to the UI SECURITY menu by pressing PAGE, either once or twice (for a dual loop controller):

(*) For dual loop instruments, before returning to the above menu, you will need to repeat the steps 'a' to 'f' above after having selected the second loop (LOOP 2)

g- Next select the LEVEL 1 PAGES sub-menu using ⟳ and repeat steps b, c, d e and f.



Note : In the sub-menus LEVEL 1 PAGES and LEVEL 2 PAGES, the options are ACCESS (Accessible) or HIDE (hidden)

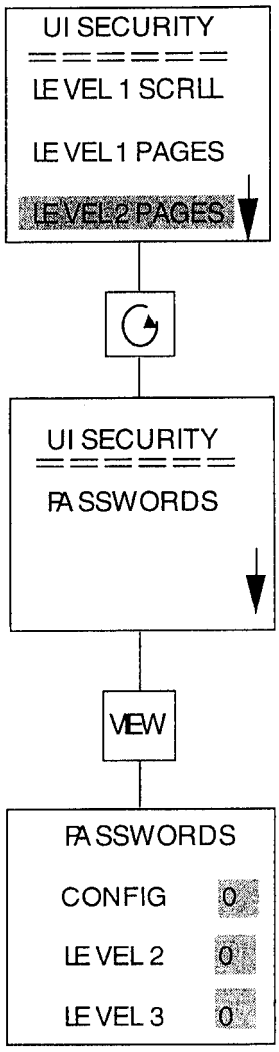
h - Follow the same steps (g, above) for LEVEL 2 PAGES

i- Press ⟳ three times to access the passwords for levels 2, 3 and configuration mode, and proceed to the next section. Alternatively, press PAGE three times to return to the main screen.

ENTERING PASSWORDS

The three 'password' codes that are used to control access to levels 2, 3, and configuration mode, are set using the UI SECURITY menu:

Set the password code using △ or ▽. Use [C] to move between the passwords.



IMPORTANT : We recommend that you make a note of your password codes. However, should you forget your level 3 access password, contact your local Eurotherm sales office for details of the procedure to follow.

Chapter 4

COMMISSIONING

Contents Page

(Contents continued)

GENERAL

Your instrument has been delivered with standard default settings for all parameters: all these values may be changed in level 3 of operator mode. It is essential to set the parameters listed below during the commissioning of your controller (please see the glossary which forms an appendix to this manual for information on other parameters).

CONTROL LOOP PARAMETER SETTINGS

Control parameters must be set for the conditions and requirements of individual processes. The values for such parameters may be calculated manually or automatically. However, whatever the method chosen, you should first set (if required) the output power limits and the 'DeadBand'.

Output Power Limits and Dead Band

Output power limits and the dead band between the heat and cool channels must be determined manually and set before the other parameters for the control loop are determined.

Output Power Limits

The reverse and forward acting outputs have limits which allow a maximum and minimum value to be specified for the power applied to to the load.

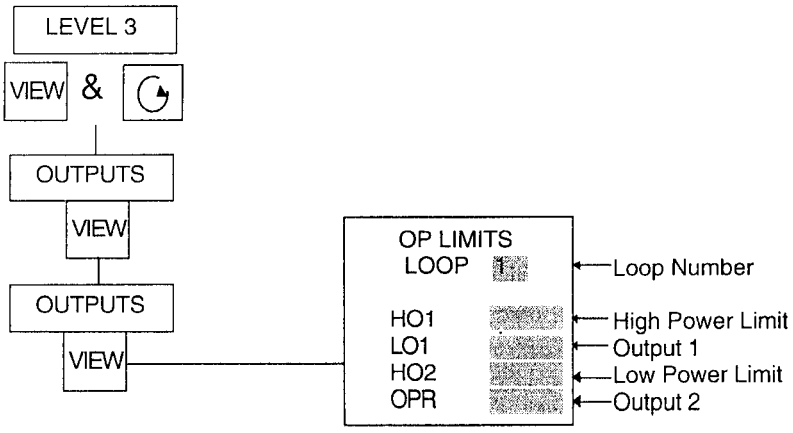
These parameters are :

- LO1 (minimum) and HO1(maximum) for the inverse (heat) channel, which may be set between 0 and 100%
- HO2 (maximum) for the direct acting (cool) channel, may be set between 0 and 100%

Example : If you are driving a resistive load with a nominal voltage of 220V, and your supply is 240V, setting the output power limit HO1 to 80% will ensure that the resistance will not dissipate more power than the rating allows.

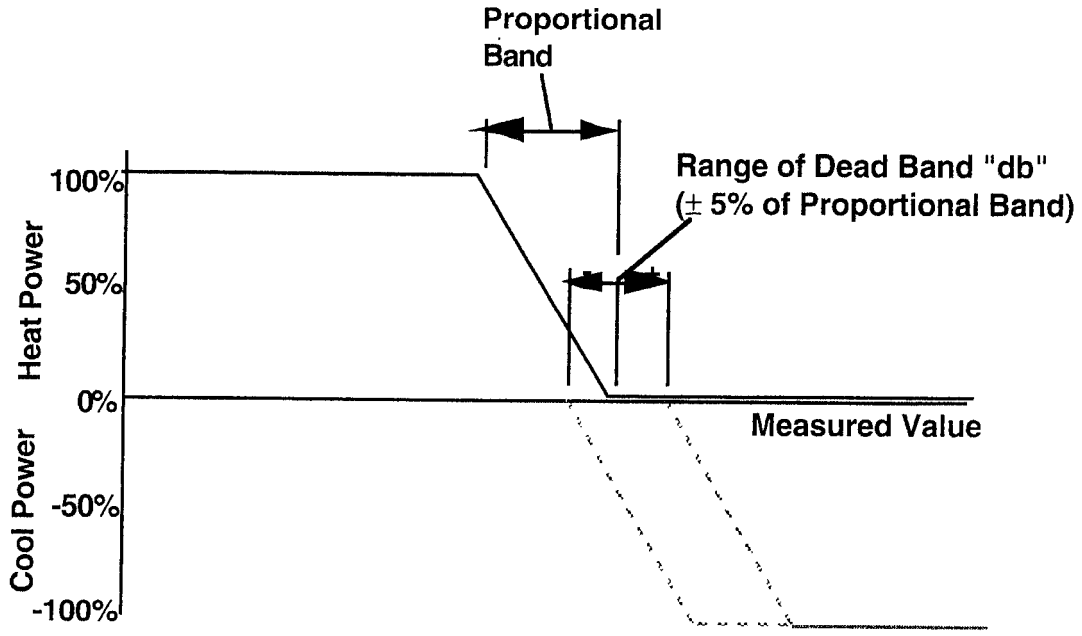
These parameters are available:

- In the scroll list on the main screen (see Chapter 2, Operator mode), providing that write access has been authorised. (See chapter 3, Access Levels)



Dead Band

For controllers that have both a forward (cool) and a reverse acting (heat) channel, the parameter db1 (dead band loop 1) or db2 (dead band loop 2) gives the distance between the two proportional bands. Their values may vary between -5 and +5% of the value of the proportional band for loop 1 (pb1) or loop 2 (pb2).
If one of the two outputs is analogue, it may be necessary to specify a negative dead band.
For example, when a channel drives a thyristor stack with a security offset, the thyristor unit will not deliver more power until the command signal reaches the value zero. It is necessary therefore to specify a negative dead band in order to avoid a discontinuity in the control.
A positve value is required when you need to assure that the 2 channels are never active at the same time, principally when using time proportioned outputs.



PID Parameters and Cutback

Description of Methods available

The 900 EPC provides several methods by which the settings of these parameters may be obtained. Choose one of them depending on the constraints imposed by your process.

- Manual Method (Ziegler Nicholls)
- Gain Scheduling: useful for processes requiring a fast adaptation time in different zones of operation.
- An Auto tune algorithm which calculates automatically the control parameters when the installation is being commissioned.
- An Auto Adaptive Tune algorithm which recalculates the control parameters during operation.

The first three methods may be used in combination.

Description of the Auto Tune Algorithm

The auto tune may be manually initiated at any time and allows the user to retune the instrument control parameters to suit a new setpoint or process loop condition. The new PID terms are set automatically.

Parameter	Mnenomic	Parameter	Mnenomic
Proportional Band	PB	Cutback High	CH*
Integral Time	TI	Channel 1 Cycle Time	CT1**
Derivative Time	TD	Channel 2 Cycle Time	CT2**
Cutback Low	CL*	Relative Output 2 Gain	R2G**

* Only one of these parameters is modified by this routine, and then only if the measured value was more than 5% of span away from the setpoint at the start of the auto tune routine. If the measured value was initially lower than the setpoint, CL is modified; if higher, CH is changed.

** All or some of these parameters may be missing from the commissioning list, in which case they will not be set by this routine.

Notes :

1. Whilst auto tune is active the parameters cannot be altered.
2. During auto tune the controller will apply either full heat or zero power or, if fitted, full cool power during this sequence. Tuning at reduced power is possible by reducing the output 1 limit and/or the output 2 limit to the power required.
3. Auto tune operation will be suspended if the instrument is switched to manual whilst in auto tune. On reselection of auto, the tuning will recommence from the start. The instrument will not auto tune when configured in the ON/OFF mode or when the second setpoint, ramp, or program is enabled.
4. If the integral time (TI) parameter is turned off, the instrument tunes as a PD controller.

If the derivative (TD) parameter is turned off, the instrument tunes as a PI controller.
If both integral and derivative time are turned off, the unit tunes as a P only controller.
For best results:
a) The process value should be steady before commencing auto tune.
b) Use the usual start up situation.

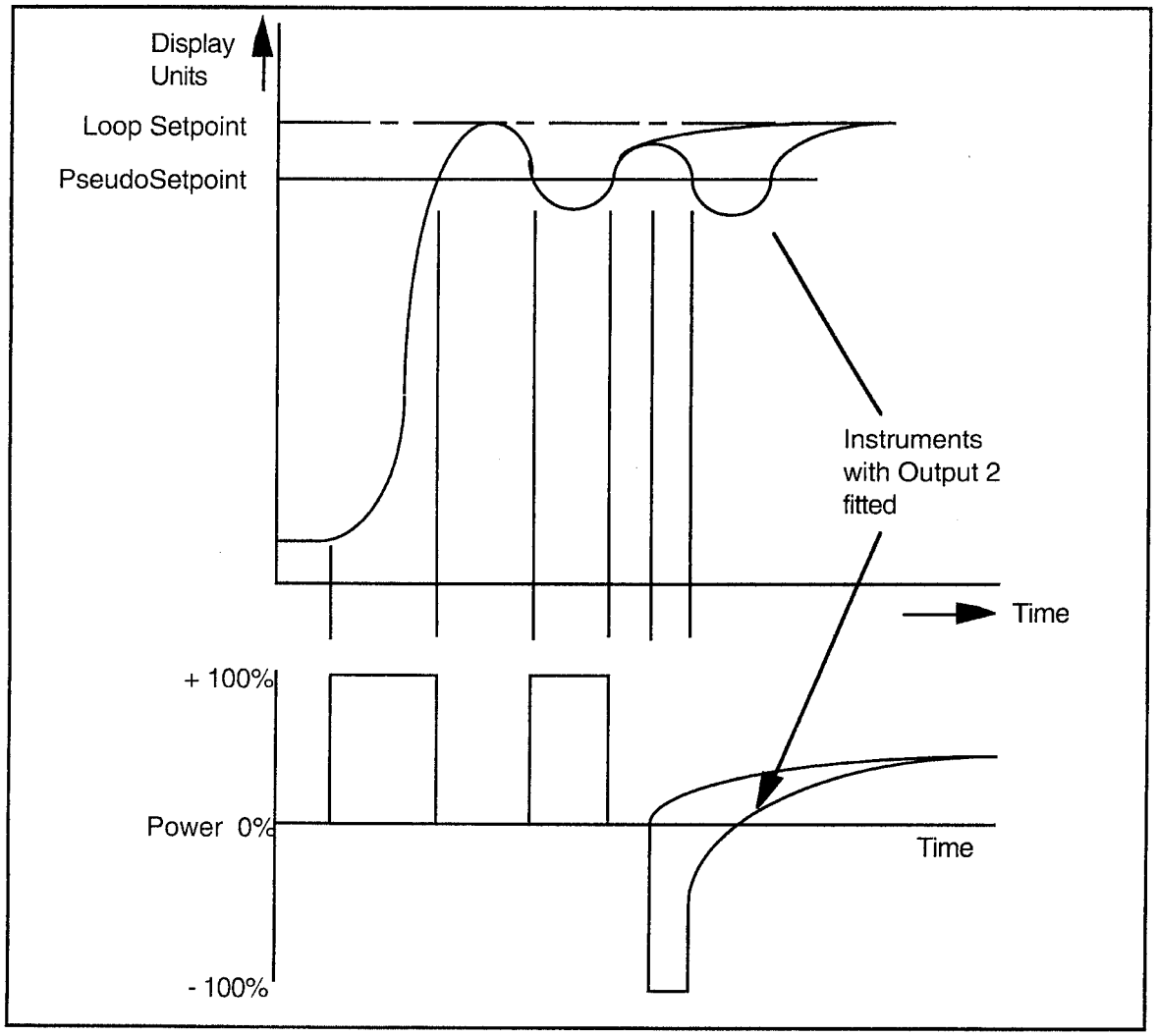


Figure 4-1 Typical Auto Tune Sequence

Description of Auto Adaptive Tuning

Auto adaptive tuning is based on a combination of:

- Disturbance Response Analysis (DRA) which analyses the responses of the loop to disturbances.
- A Model Reference Self Optimiser (Least Squared Adaptive Tuner, LSAT) which continuously fine tunes during normal operation.

These 2 systems operate simultaneously.
Adaptive tune should be used in the following cases:
1) Processes that require frequent parameter variations as a result of load, setpoint, or other changing conditions.
2) Processes that cannot tolerate the on/off sequence required for the self tune.
3) On processes that experience regular external disturbances.
4) Where the process is known to have a non-linear characteristic.

Notes:

1 - Adaptive tune will be suspended if manual operation is selected, but is automatically reinstated when the instrument is switched back to automatic operation.
2 - Adaptive tune will not operate on a controller configured with an on/off output.
3 - If integral is turned off the adaptive tune algorithm may switch it on in order to achieve zero error.
4 - Adaptive tune will operate on all setpoints.
Whilst adaptive tune is operating, the proportional band, the integral time and the derivative time may not be changed manually.

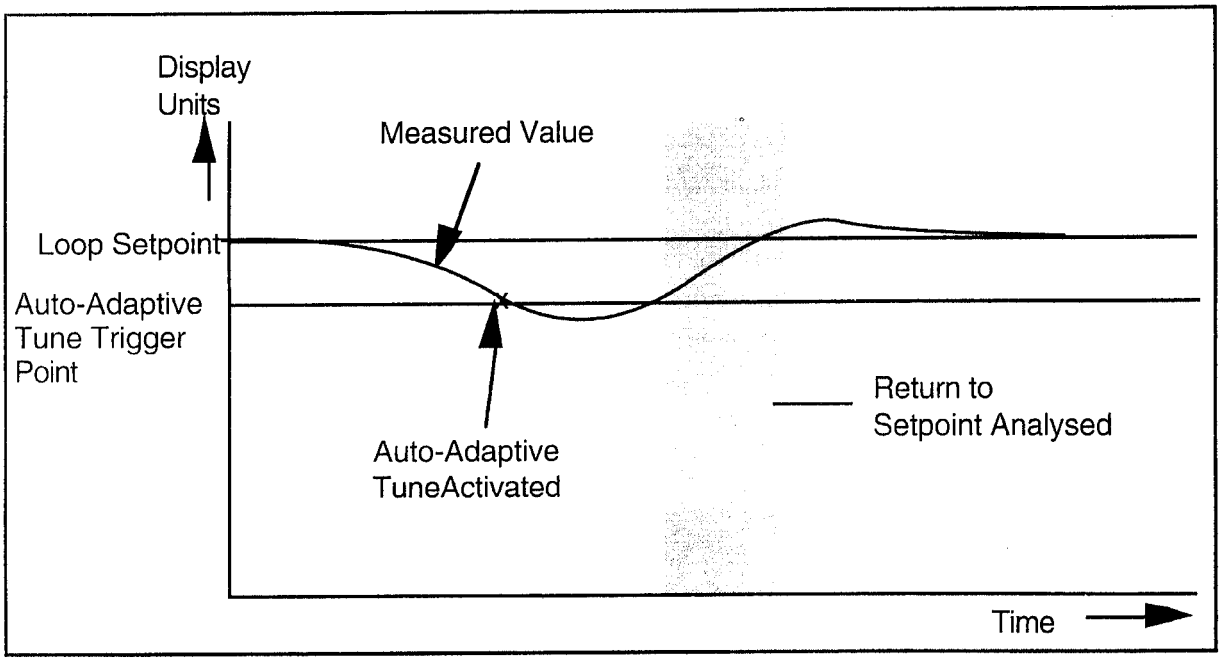


Figure 4 -2 Auto Adaptive Tune Sequence

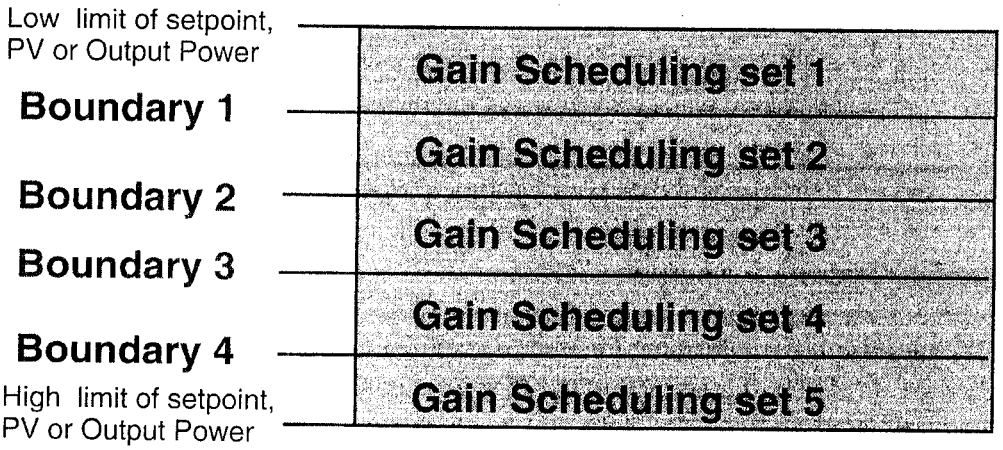
Disturbance Response Analysis : DRA

The DRA has a trigger point which is the value of error signal required to activate adaptive tune. This point is set automatically by the controller but may be manually readjusted in the range 0.1 to 25% of span (minimum of 1°C on temperature ranges). The level set will depend on the level of process noise.

Disturbance Response Analysis is a background algorithm that continuously monitors the error signal, measured value, and setpoint and analyses loop response during process disturbances (load disturbances and setpoint changes). If the algorithm recognises an oscillation or under damped changes, the PID parameters are automatically recalculated from the measured closed loop response.
*Model reference Self Optimiser: LSAT
LSAT (Least Squares Adaptive Tuner) is a tuning system which works by building a mathematical model of the process under control. This model is kept continuously updated and compared with the actual process to ensure that the model reflects it at all times. At the same time, P, I and D terms on the controller are adjusted, with reference to the model, to keep the process under tight control.

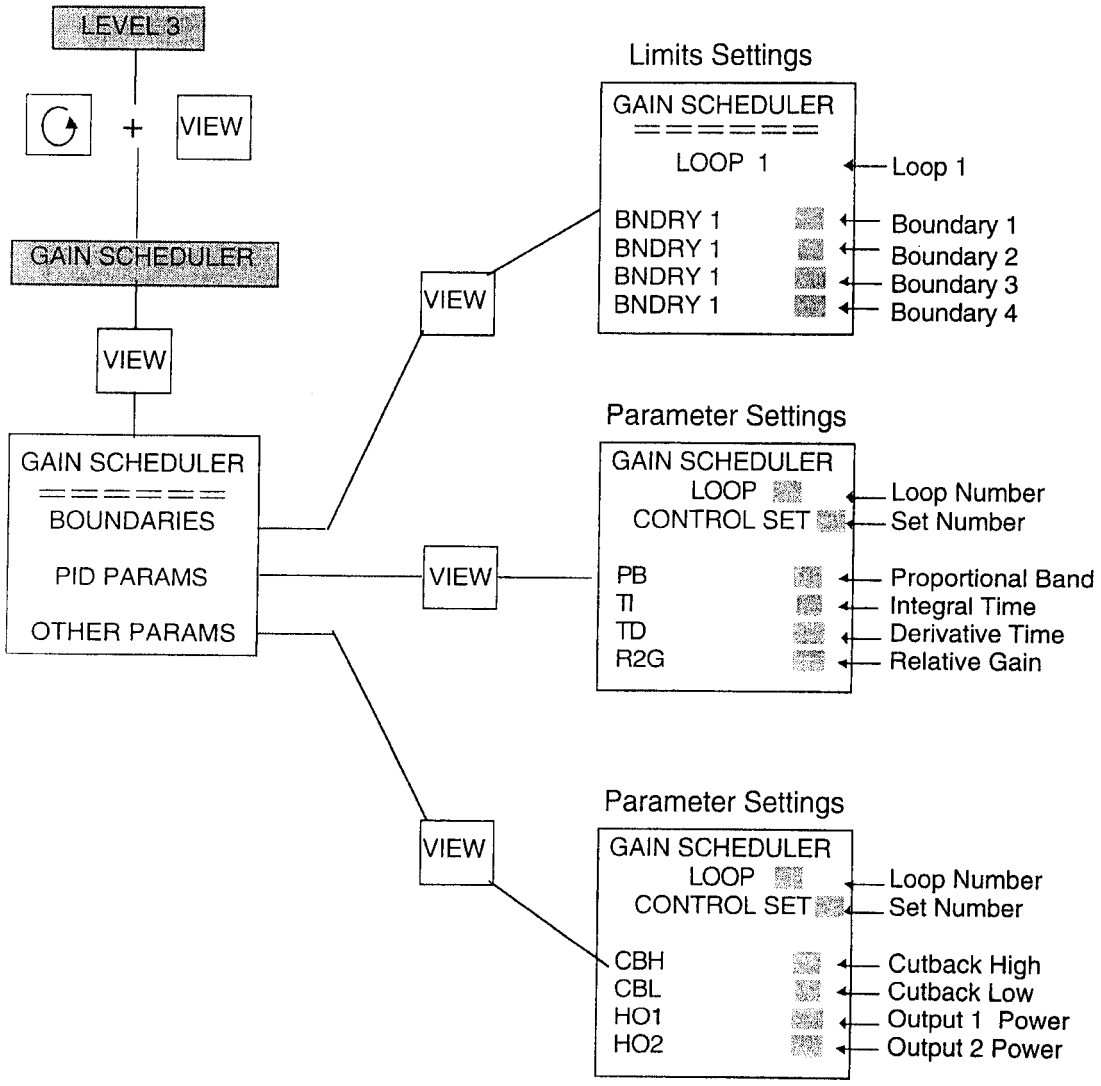
Description of Gain Scheduling

Gain scheduling tables comprise sets of control parameters which are set automatically as a function of a predefined condition.
These parameters are the following:
Proportional Band (PB), Integral Time (TI), Derivative Time (TD), Cutback high (CBH) or low (CBL) or Relative Cool Gain (R2G), and Power Limits (HO1 and HO2).
There are five parameter tables which may be activated as a function of a pre-determined value of the measured value, the setpoint, the error, the output power, a remote input, a digital input, or via the front panel of the instrument (this is configured using 'User Configuration': see page 5-32). The transfer between one table and another is made in a single, bumpless, operation to ensure totally smooth control across all operating zones of the process.
These five tables are situated on a scale with limits corresponding to the maximum or minimum for the setpoint or measured value, or between -100% and 100% for output power. The gain scheduling boundaries should be set starting with the highest value (limit 4), down to the lowest value.



Entering Parameter Values

Enter level 3 (LEVEL 3) in Operator mode and follow the procedure below:



Notes:

When entering boundaries (BNDRY), start with BNDRY 4.

Parameters associated with auto tune are automatically calculated.

Automatic Tuning Methods

Prerequisities

* Check that the TI, TD, CL and CBH parameters are set to non-zero values.
* Set the cycle time CT1 and CT2 parameters (if configured) to 10 seconds.

Selecting an Algorithm

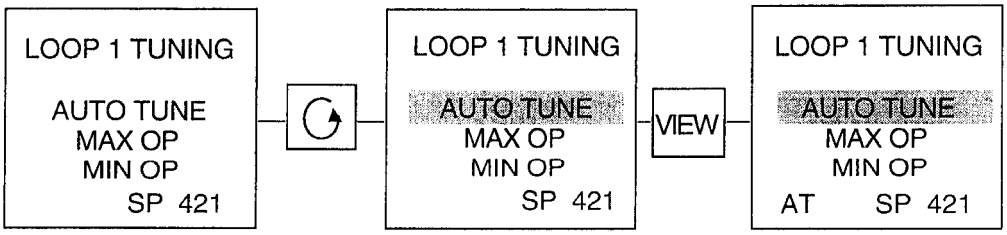
You may choose between the following tuning methods:

- Auto Tune ..... AT
- Auto Adaptive ..... ADT
- Gain Scheduling ..... SCH
- Auto Tune and Auto Adaptive ..... AAT
- Auto Tune and Gain Scheduling .... ATS

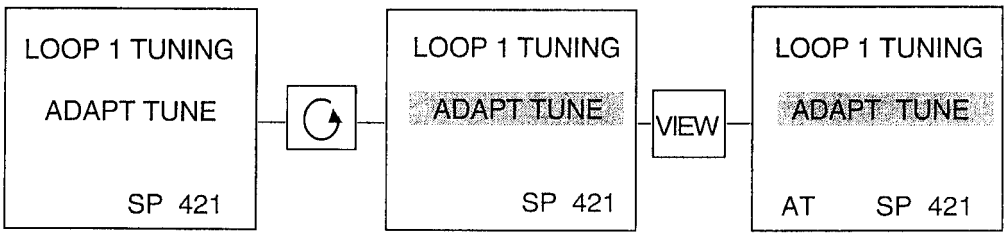
The selection of a method may be made either using a digital input configured for this function, or via the front panel of the instrument; the procedure for this is as follows:

* Access the LOOP -- TUNING screen.
  - In level 1 and 2 (if available) by succesive presses of PAGE
  - Otherwise in level 3 by pressing ◯▲ successively, then (VIEW) to access the screen.
* Press ◯▲ to select the tuning type required, and then (VIEW) to enter it. The abbreviation for the selected algorithm will appear at the base of the screen. The messages will differ, according to the configuration of the algorithm.

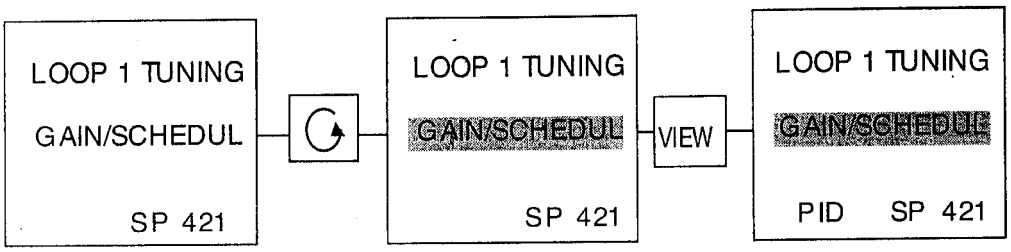
Configuration for Auto Tune only



Configuration for Auto Adaptive Tune only

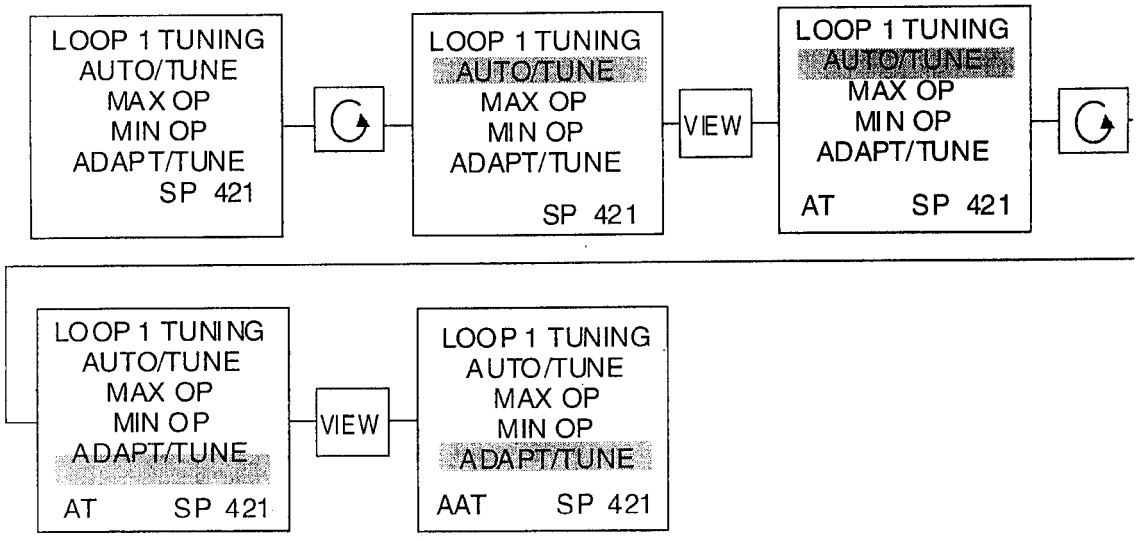


Configuration for Gain Scheduling only

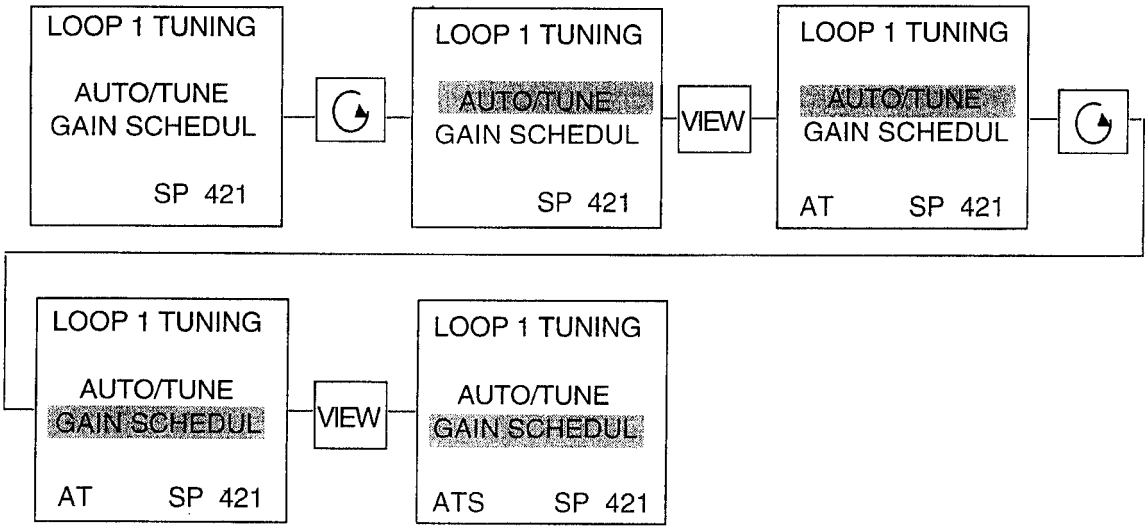


Note : Before selecting a parameter table, it is essential to set the gain scheduling boundaries.

Configuration for Auto Tune and Auto Adaptive Tune



Configuration for Auto Tune and Gain Scheduling



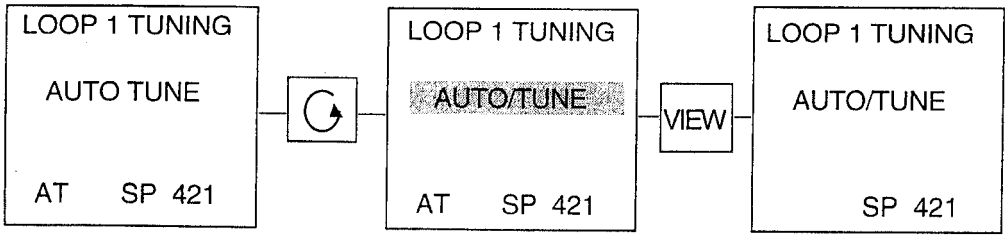
Stopping the Tuning Process

* The tuning may be halted at any time by accessing the tuning screen by pressing PAGE several times.

* Use  to select the desired algorithm

* Press  , and the abbreviation of the algorithm will disappear.

Example :



Manual Tuning Methods

Setting Cycle Time

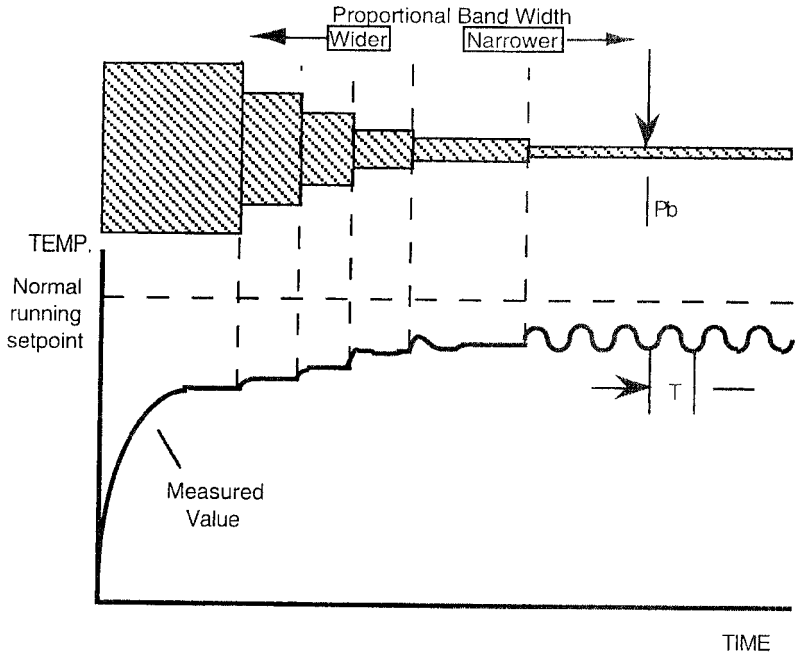
If either or both control outputs uses time proportioned outputs (relay, logic, or triac), you will need to set the cycle time of the output CT1 (output 1) - CT2 (output 2). These values are expressed in seconds and may be found in the parameter scroll list in levels 1 or 2 (if made available), or otherwise in level 3 in the OUTPUTS menu, sub menu CYCLE TIME.

Setting the P.I.D Parameters

There are several methods that may be used to perform manual tuning. Only the Ziegler-Nichols method will be described in this manual.

Case of a Single Control Output:

* When the cycle time (relay, logic, or triac) has been set, set the 900 EPC to operate as a purely proportional controller by setting TI and TD to 0.
* The 900 EPC setpoint must be set to its working value. The proportional band (PB) should be set to a large value (300%, for example).
* Apply power to the control loop and observe the behaviour of the measured value. This should settle to a stable value without oscillations.
* Once the measured value is stable, reduce the proportional band to around 70% of its previous value.
* Each time the proportional band is reduced, observe the settling of the measured value. When a change in PB results in oscillations, note the value of PB and the period of oscillation 'T' (see figure below).

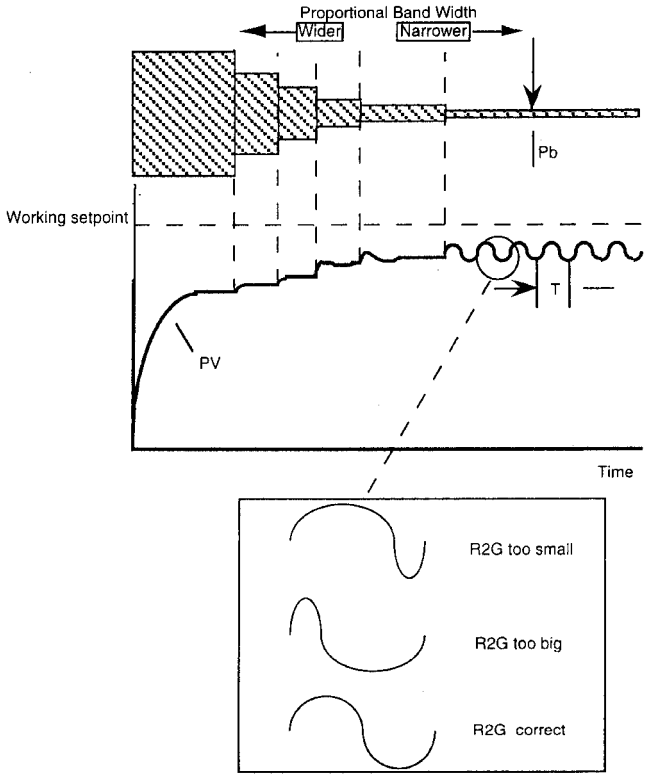


The value for **PB** that caused oscillations, and the duration of the oscillations may be used in conjunction with the following table to determine the values required for proportional only control, for PI control, or for PID Control.

PARAMETER SETTINGS			
Control Type	Proportional Band	Integral Time	Derivative Time
P	2 PB (oscillations)		
P.I	2 PB (oscillations)	0.8 T	
P.I.D	1.67 PB (oscillations)	0.5T	0.12T

Case of a reverse acting (heat) channel + direct acting (cool) channel

* Disable the second output by setting CBL to 0.
* Follow the procedure given above for a single output.
* When the controller has an inverse and a direct output, the proportional band for the second output is calculated using the R2G (relative cool gain) parameter, which is a multiplier to the proportional band for the first output. This relative gain must be set before entering the final values for PB, TI and TD.
* Re-enable the second output, and follow the procedure once again, adjusting R2G in order to obtain symmetrical oscillations.
* Once this operation has been performed, set the values for PB, TI and TD.

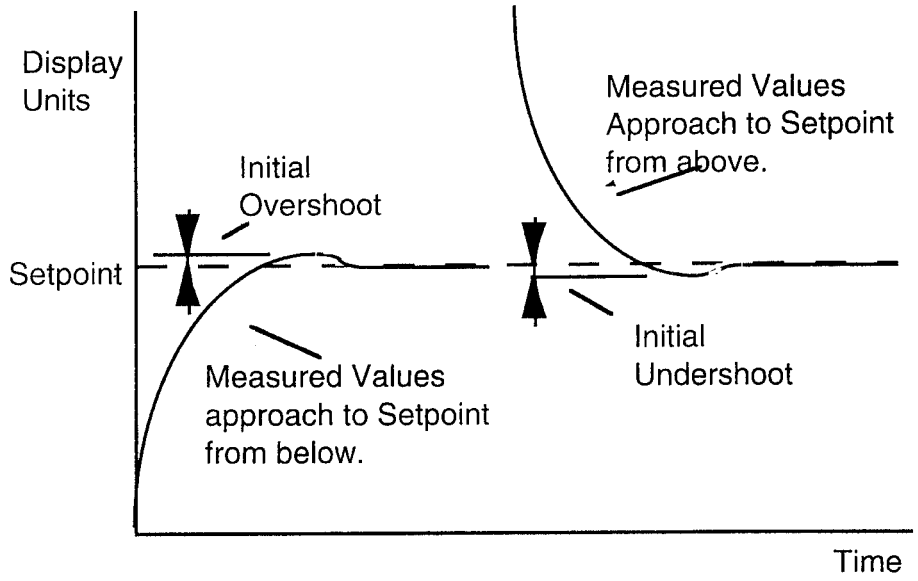


Setting Cutback High and Cutback Low

To set the parameters used to suppress overshoot, CBL and CBH , you need first to cancel their effect by setting them to the value of the proportional band converted to display units. This may be calculated using the following formula:

$$\frac{PB}{100} \times \text{Controller Span} = CBL = CBH$$

A cooling operation should then be commenced, and the overshoot value noted in order to select values for cutback low and high. In the case of overshoot, you will need to increase CBL by the value of the overshoot; for undershoot, you will need to increase CBH by the value of the undershoot.



CASCADE CONTROL

Introduction

Cascade control is used to obtain improved control when a process has a large lag. A master/slave configuration allows control of 2 linked loops: the slave controls the primary loop and the master monitors the process.

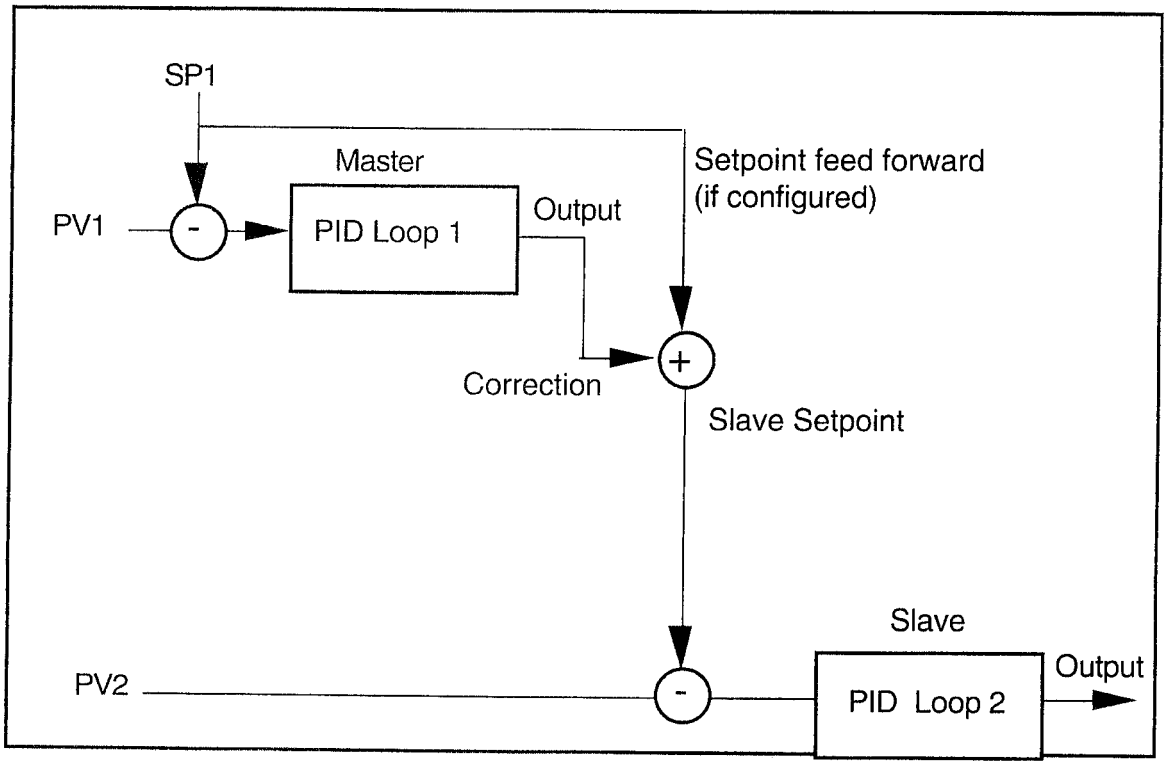
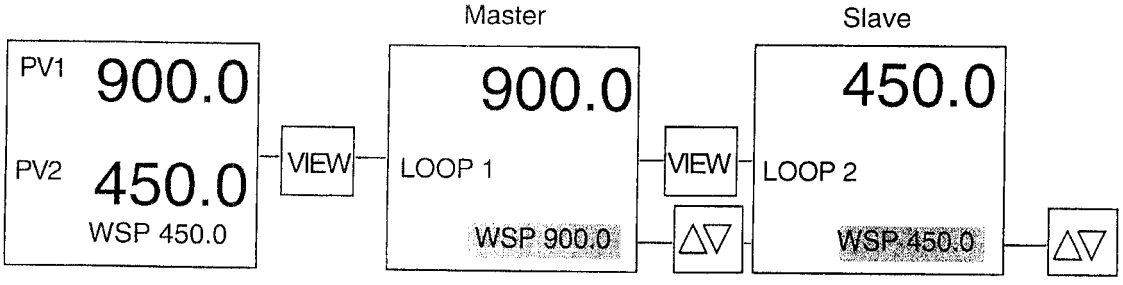


Figure 4-3 Block diagram of a Cascade Controller

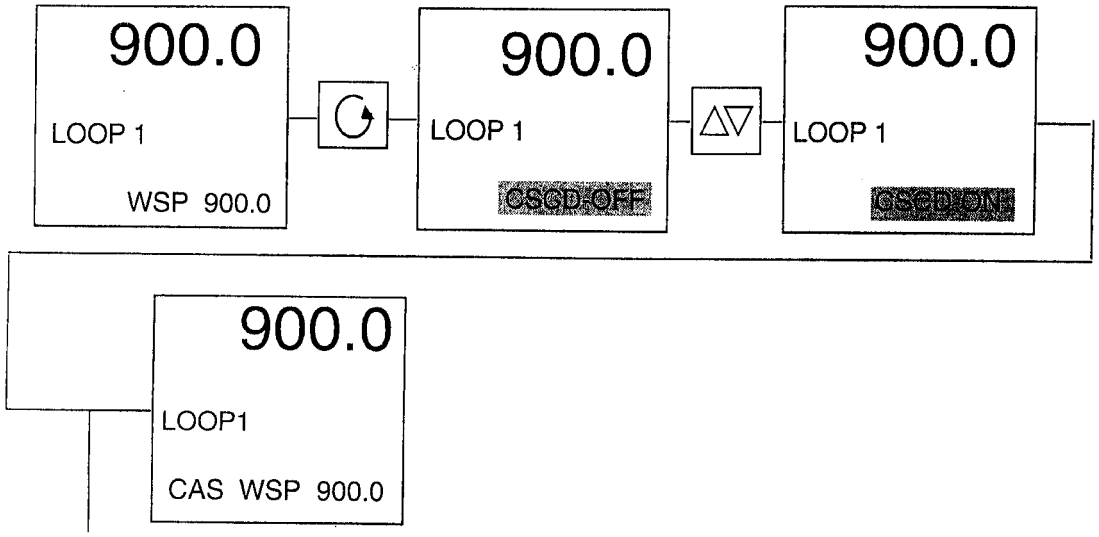
Operation

General

Loop 1 is generally the master, and loop 2 is the slave. The slave loop must be faster acting than the master. The parameters for each loop can be viewed in turn.



When cascade is enabled, CAS is displayed unless this has been overridden by the instrument being in manual operation, in which case MAN is indicated.



Setpoint Tracking

When this function is configured and cascade is selected OFF, the slave setpoint tracks into the master output, giving bumpless transfer between single loop, slave, and cascade control.

Setpoint Feedforward

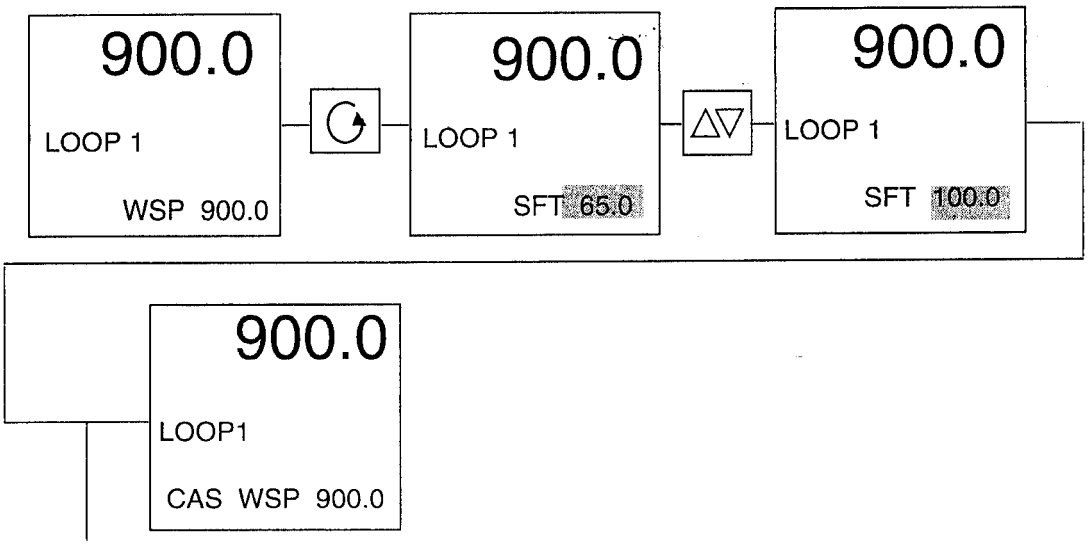
Important : The slave and master setpoint ranges should be the same for both loops.

When setpoint feed forward is configured for the master, the SFT parameter (setpoint feedforward trim) defines the maximum limits of the deviation from the master setpoint to which the master PID can trim the slave setpoint.

Example :

The 900 EPC controls in cascade mode in the range 0-200°C, and the master setpoint is 100°C :

- With setpoint feedforward trim SFT set to 20%, the slave setpoint is not permitted to exceed 140°C.
- With setpoint feedforward trim SFT set to 100%, the slave setpoint may take any value required by the master PID, subject only to its own limits. This corresponds to a full scale cascade control with an additional proportional step resulting from setpoint changes.



Note :
Setpoint Feedforward may not work as expected with Cascade control if the master and slave setpoint ranges are different.

Auto-Manual Operation

Typically the instrument is configured for manual tracking on both master and slave loops. It is often necessary to start industrial processes up in manual to achieve a safe state or for operational convenience. Having achieved this state, it is important that the controller does not 'bump' the process when changing to automatic control. This is facilitated by forcing the loop setpoints to track their respective process values, when the loops are in manual. When a loop is in manual mode therefore, the setpoint of that loop cannot be manually adjusted. (When cascade operation is enabled the slave setpoint cannot be manually set at any time).
Changing the slave to auto causes the controller to initially retain its last output. The slave setpoint at this instant is automatically equal to the slave process value, thus passing bumplessly to automatic control at this fixed setpoint.
A subsequent change to automatic control in the master loop causes the master output to be set to a value equivalent to the existing slave setpoint, while the master setpoint is fixed at the master process value.

This leads to the following behaviour:

- When the master loop is in manual mode, its setpoint tracks the measured value.
- When the slave loop is in manual mode, its setpoint tracks the measured value, and additionally the master output tracks the slave setpoint.

Once the changeover to fully automatic cascade control has been achieved all changes to the process are made by adjusting the master setpoint. Should manual changes of the process be necessary then putting the slave in manual causes the slave output to be frozen at its last value until the output power is changed by the operator. While the slave is in manual the master output is forced to track the scaled slave measured value, so that when the slave is returned to auto both master output and slave setpoint are equal to the slave measured value.

Parameter Settings

* When the instrument is first switched on, the cascade operation will be disabled: CSCD- OFF.
* For each loop, set the output power limits HO1 and LO1 . The limits of the master loop allow the range of modification of the slave setpoint to be limited. The slave and master setpoints may also be limited in access level 3, see chapter 5.

Tuning

Manual Method

* Because the slave loop is used by the master loop, it must be tuned first. To do this, turn cascade operation off (CSCD-OFF).
* Next refer to the section on manual tuning, see chapter 4.
* Once the slave loop has been correctly tuned, turn off the derivative action (TD = 0)
* Turn cascade operation back on (CSCD - ON) and refer to the section on manual tuning, see chapter 4.

Note :
You are recommended to use a derivative action on the slave loop in order to avoid fluctuations on the slave loop.

Automatic Method

* Simply select the auto tune algorithm required for the master loop,(see chapter 4 for details of the selection procedure). Once selected, the algorithm proceeds by tuning the slave loop, followed by the master.

Auto Adaptative Tuning

This algorithm can be configured on the two loops and will function in the same way as it would on two independant loops, although you may notice a few differences in certain cases (when there is a significantly large interaction between the two loops). To ensure safe updates, the auto adaptive tune cancels updates if the setpoint changes by more than a few % points. The auto adaptive tune operation will therefore not change the PID parameters if the master loop is too active and creates significant changes to the slave setpoint.

RATIO CONTROL

General

Ratio control is a technique used to control a process variable at a setpoint that is calculated as a proportion of a second process input. The Ratio Setpoint determines the proportion and can be applied to the second process input as either a multiplier or a divisor.
The basic ratio configuration is single loop ratio control, and an example of this is given in the figure below.

Description of the different configurations of a Ratio Controller

According to the options specified when you ordered your controller, your 900 EPC will have one of the following configurations. You may check which one using the INSTR TYPE sub menu from the INSTR CONF menu (see chapter5).

* A classic Ratio Controller : Configuration RATIO CONT

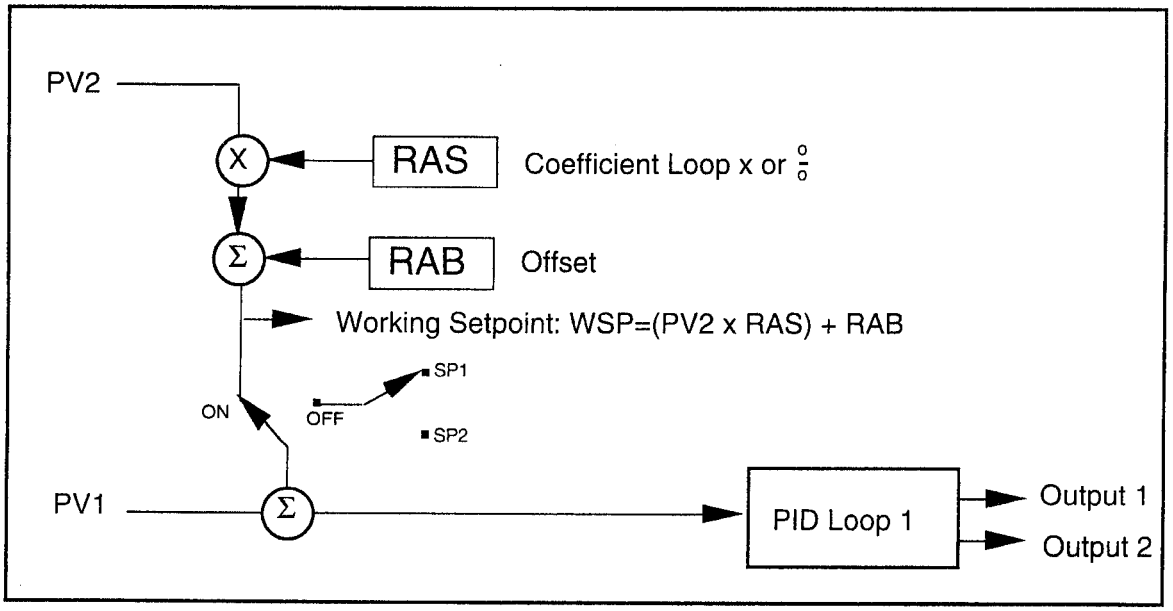


Figure 4-2 Block Diagram of a Classic Ratio Controller

* Ratio Controller with 2 PID Outputs
Configurations : RAT & NORM CONT - RAT & NORM PROG

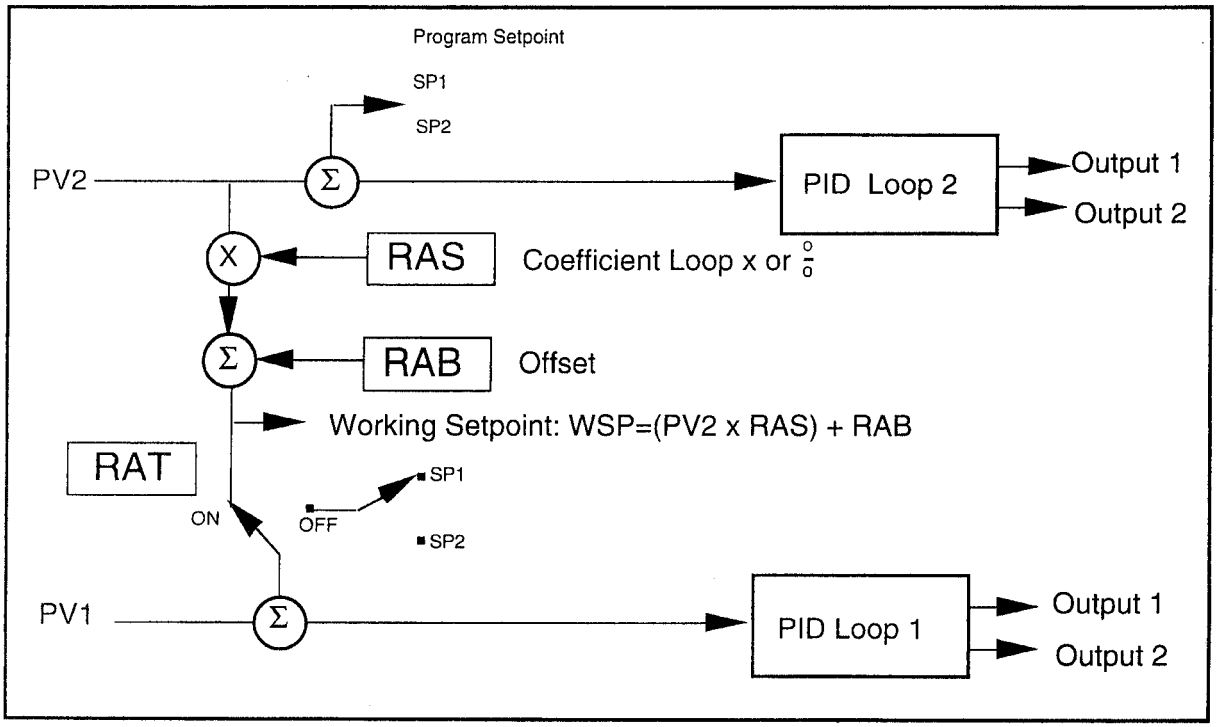


Figure 4-3 Block diagram of a Ratio Controller with 2 PID Outputs

* Ratio Controller with second independent loop
Configuration: RAT & INDP CONT

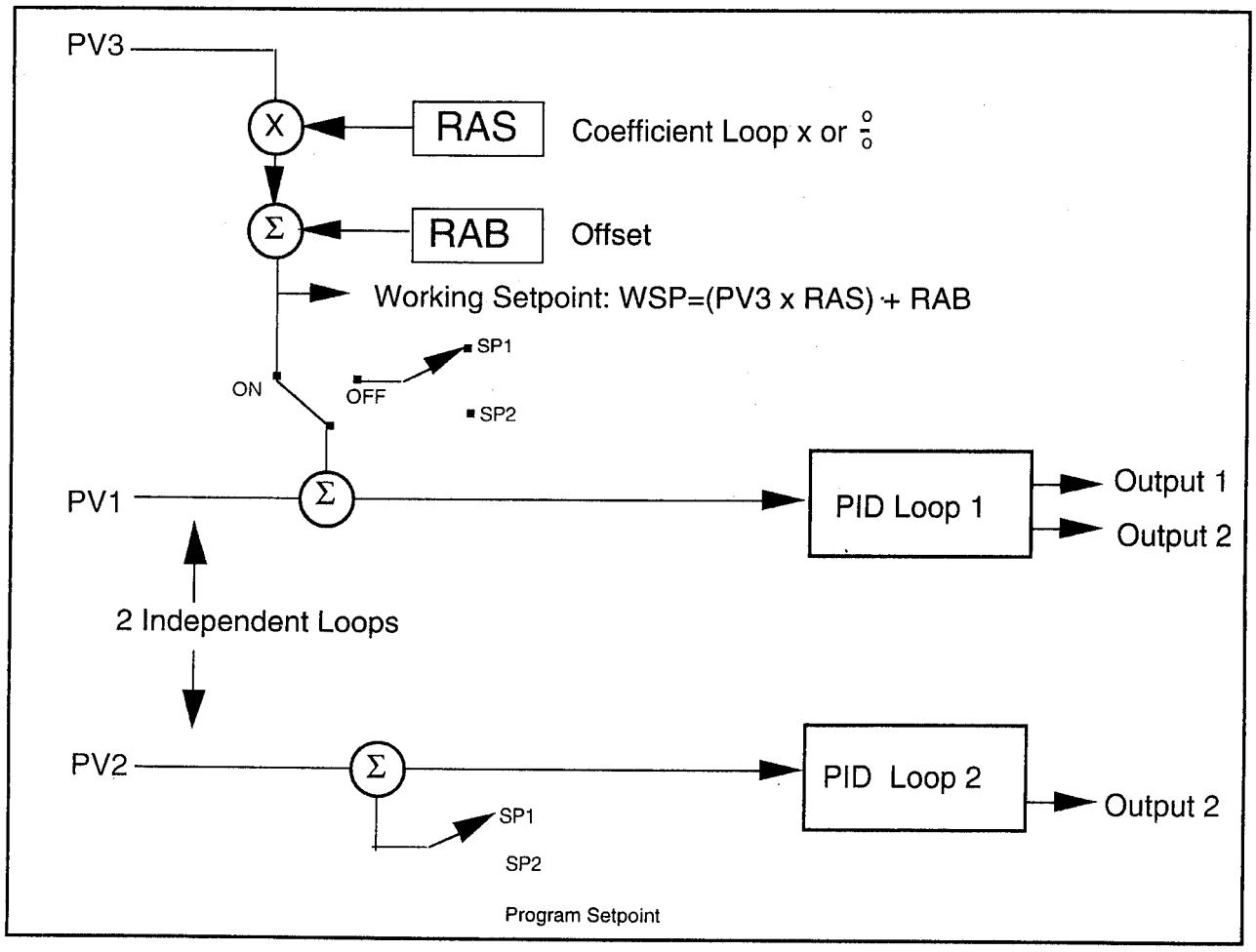


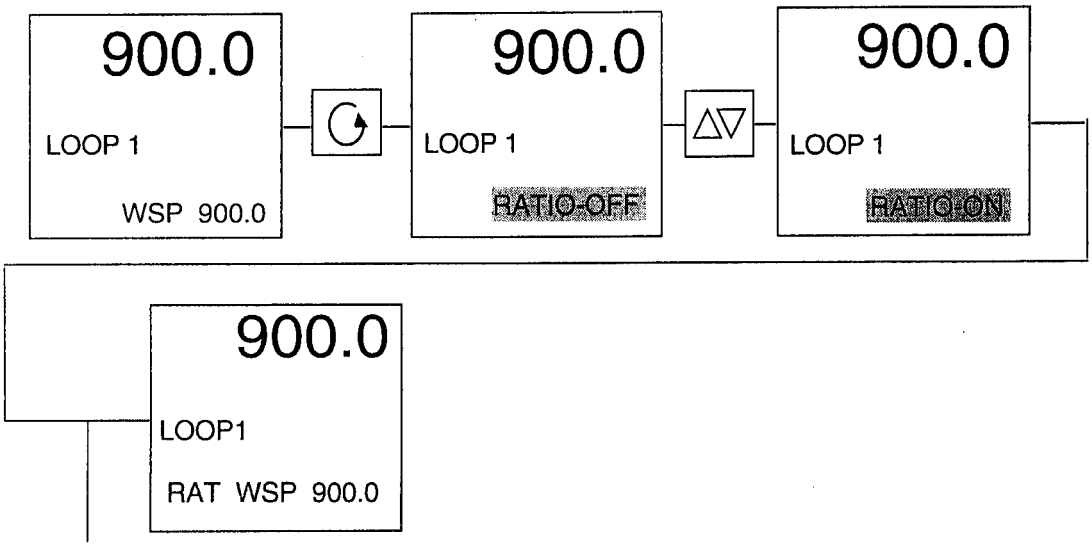
Figure 4-4 Block diagram of a Ratio Controller with a second independent loop

Setpoint Tracking

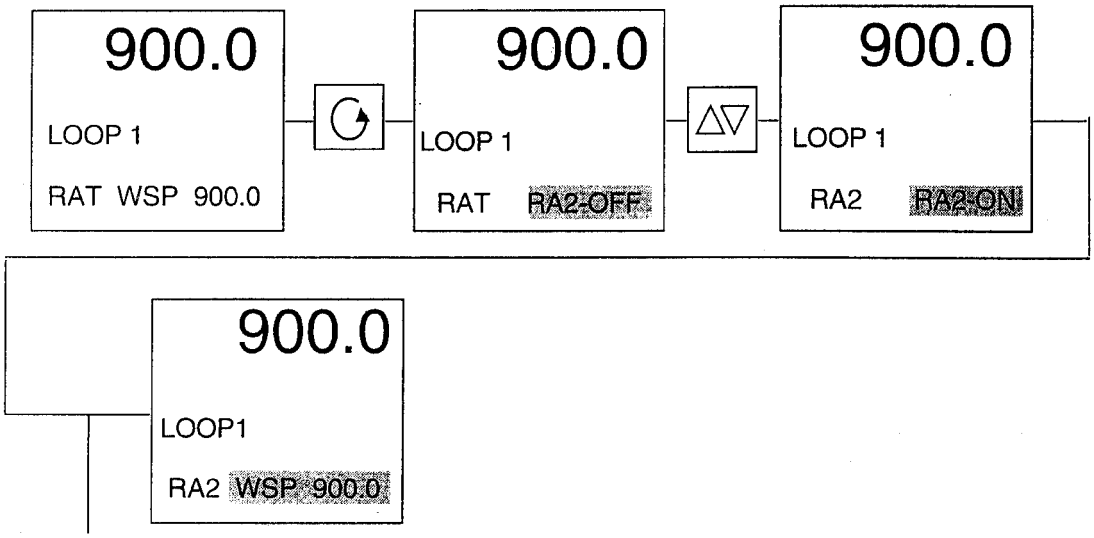
When ratio setpoint tracking is configured, activating ratio control will cause the ratio setpoint to be modified so that the transfer occurs bumplessly. Equally, when the ratio control is de-selected, the working setpoint will be tracked into the local setpoint.

Selecting Ratio Operation

Ratio operation may be selected in level 1 in operator mode when the internal setpoint is selected. This operation is performed using the following procedure:



Once ratio operation has been selected, the message RAT (Ratio) will appear on the lower left hand side of the screen unless the controller is in manual mode or in an alarm state in which case MAN or ALM will be displayed. The second ratio setpoint may only be selected if ratio operation has been selected.



Ratio Parameters

Parameter	Scroll List Mnemonic
Ratio Setpoint	RAS
Second Ratio Setpoint	RA2
Working Ratio Setpoint	WRS
Ratio Setpoint High	RAH
Ratio Setpoint Low	RAL
Ratio Setpoint Trim	RRT
Ratio Bias	RAB
Setpoint High	SPH
Setpoint Low	SPL
Working Setpoint	WSP

* Select auto tune (see chapter 4)
* Then select ratio operation.

Notes :
Auto adaptive tune or gain scheduling may be selected at any time
The second loop for the following configurations should be set up as for an independant loop: RAT&NORM CONT -RAT&NORM PROG- RAT&INDP CONT -RAT&INDP PROG.

VALVE POSITIONER CONTROL

Parameter List

Parameter	Mnenomic	Setting
Valve position if Sensor Break detected	VBP	CLOSED-FIXED-OPEN
Valve minimum response time	MR1 ou MR2	0.04 to 10.00s
Valve Travel Time	MT1 ou MT2	5 to 1000s
Valve Update Time	VUT	0.1 to 5.0s
Valve Position	VPF	

Tuning

Once the above parameters have been set correctly, see the sections on manual (see chapter 4) or automatic tuning (see chapter 4).

HUMIDITY CONTROL

General

Measurement and control of relative humidity is performed using 2 inputs: one is used to indicate the wet temperature (tw), and the other for the dry temperature (td). These two values are processed by the 900 EPC to give the relative humidity: RH%.
The wet temperature is always made using the input PV1 so that the relative humidity is controlled by loop 1. The dry temperature measurement is made using the input PV2 on loop 2.

Setpoints and Alarms

Setpoints may be changed within the range defined by the setpoint limits. In the case of relative humidity controllers, these limits are set to 0 and 100%.
Alarms may be applied to relative humidity and their threshold is defined in % relative humidity. They may not be applied to wet or dry temperatures.

Configuration

The 900 EPC can be configured as a single loop humidity controller (reference 907 or 908), or as a dual loop controller (reference 909 or 910) with a relative humidity loop and a temperature loop.

SWITCHOVER CONTROLLERS

This type of controller allows a measured input (PV) to be controlled using 2 sensors which work over different ranges.
The sensor that works in the lower range of measured values must be connected to input 1, and that working on the higher range to Input 2. The minimum value for input 2 will be less than or greater than the maximum for input 1. The 900 EPC wll force the input units used for input 2 to those configured by input 1. The instrument range will be defined by the minimum of input 1 and the maximum of input 2.
It is recommended that you have a region common to both sensors of at least 10% of the full scale. When the measured value is below this region, the 900 EPC will control using PV1. When the measured value is above this region, the 900 EPC will control using PV2. In the common region, the 900 EPC controls using a measured value which is a proportion of the two values (see following table).

Example : For temperature control using a thermocouple for input 1 and a pyrometer for input 2:

INPUT 1 INPUT 2 PV X	THERMOCOUPLE PYROMETER PV 1	0-800°C 500-2500°C PV 2
200°C	200°C	Sensor Break
500°C	500°C	520°C
530°C	529°C	539°C
600°C	597°C	606°C
650°C	649°C	651°C
700°C	696°C	703°C
800°C	790°C	800°C
900°C	Sensor Break	900°C

The equation used to calculate the measured value in the common region is as follows:

$X = X\ (I/P1) + (1-X)I/P2$

where $X = \frac{I/P1\ Max - Previous\ value\ for\ X}{I/P1\ Max - I/P2\ min}$

CONTROL USING THE MAXIMUM OR MINIMUM VALUE OF TWO SENSOR READINGS

Control on the larger of two readings

In this case, the 900 EPC uses the greater of the two readings, unless one of the sensors is in sensor break, in which case the other is used.

Control on the smaller of two readings

In this case, the 900 EPC uses the smaller of the two readings, unless one of the sensors is in sensor break, in which case the other is used.

STANDBY MODE

The controller may be placed in standby mode when the installation does not require control functions to be performed. The selection of this mode is made either via a digital input, by digital communications, or from the front panel. When the controller is in standby mode, control functions are no longer performed and the digital inputs no longer operate. The instrument must be configured to allow standby mode using the 'STANDBY MODE' from the 'FN AVAILABLE' menu (see flowchart page 5-59). The selection of standby mode is subsequently made in operator mode using the ◯ key to move through the scroll list. Move to the message NORMAL. Press the **D** or — key to display STANDBY. The message STY will be displayed at the bottom left of the front panel whilst in standby mode To return to normal operation, move to STANDBY and press either Δ or ∇ to display NORMAL once again.

Chapter 5

CONFIGURATION

Contents Page

(Contents continued)

(Contents continued)

IMPORTANT

Your controller has been delivered to you with the configuration that you specified when you made your order, or with a factory configuration that is suitable for the majority of applications.
If reconfiguration of one or more functions of the instrument is necessary (due to changes in the application for example), please follow the procedures in this chapter and make a careful note ofyour changes using the configuration record forms which form an appendix to this manual. Your configuration may also be recorded and backed-up using the IPSG PC tool: contact your local Eurotherm sales office for more information.

GENERAL

Hardware

900 EPC Controllers may be reconfigured to requirements on site because of their modular design and the easy to use menu system employed. All controllers in the 900 EPC range comprise a micro-processor board, a power supply board (on which a digital communications interface is fitted as standard) and a display driver. In order to provide the various functions required by a given application (control, alarm, setpoint retransmission, digital IO, etc), removable options boards may be fitted, onto which various plug-in hardware modules may be fitted (each options board may be fitted with up to 3 modules).

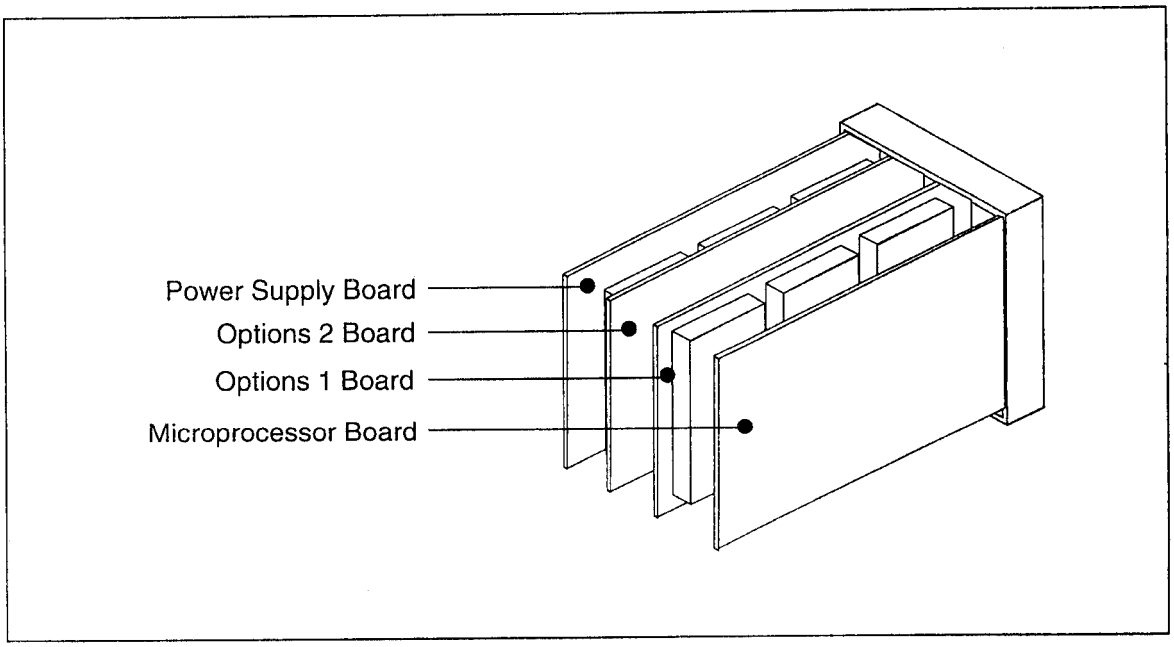


Figure 5-1 Board Placement

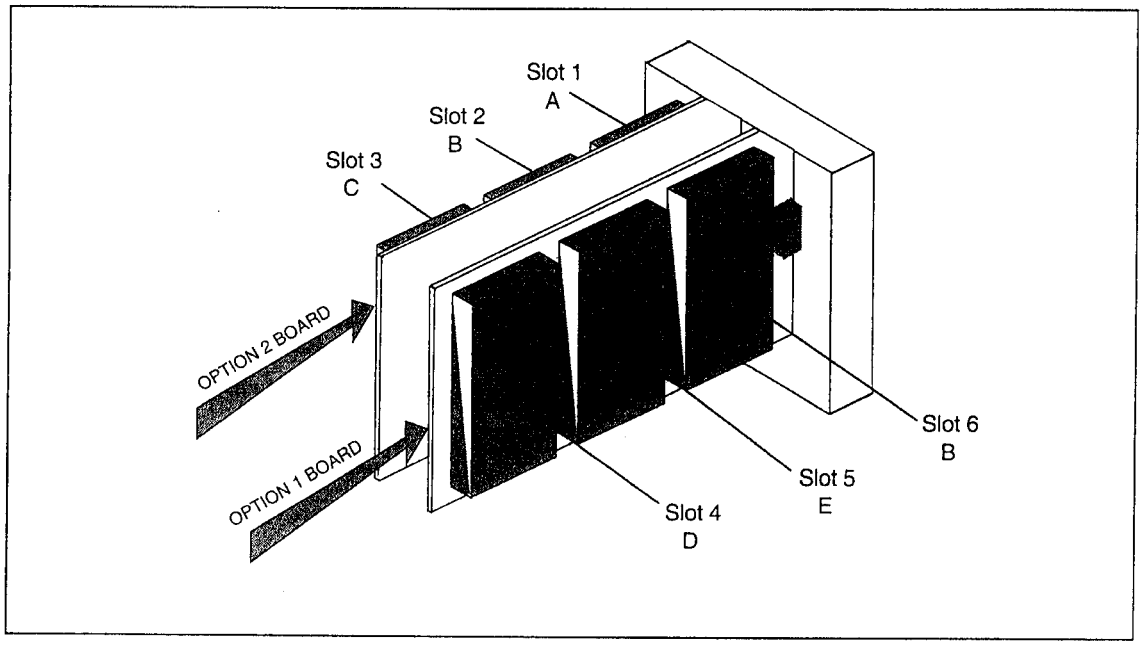


Figure 5-2 Module Placement

Module Types Available

Auxiliary Analogue Input
Analogue Retransmission Output (Linearity : ± 0.25% Span)
Analogue Control Output (Linearity: ± 3% span)
VP Feedback potentiometer input
Single Relay Output
Dual Relay Output
Dual Triac Output
Transducer Power Supply
Single Logic Output
Triple Logic Output
Quad Logic Output
Quad Logic Input *
"Master" Digital Comms (Must be in position 6)

The user may attach a function to each module fitted in an instrument using the configuration mode of the instrument.

Example : The analogue retransmission module may be set to transmit the measured value of control loop 1.
*All 900 EPC controls have two digital inputs (non isolated) fitted as standard.

Configuring the Instrument Software

Once the hardware has been fitted and defined, you will need to set or verify the software configuration of the instrument in order that it corresponds to the functionality required. Note however that the instruments have already been factory configured according to the order code.
The configuration of an instrument is divided into two parts:

The first is **USER CONFIGURATION** which is primarily for the use of the customer as it contains the most frequently required functions (alarm type, etc).

The second is **INSTRUMENT CONFIGURATION** which includes hardware configuration (input type, I/O function, control type, etc). Such options are likely to be changed less frequently than those in User Configuration.
All configurable options are grouped by type in Sub Menus.

SUB -MENUS	CHANGES POSSIBLE IN USER CONFIGURATION
Alarm Conf	Type - Latch Status - Hysteresis - Alarm Delay
Control Conf	Action (Direct /Reverse) - Derivative Action - Power Feedback
SP Tracking	Manual Mode- Remote SP tracking - Ratio and Cascade
Functions	Standby - SP Rate Limit - Manual Function - etc
Tuning Options	Auto Tune - Adaptive - Cont Adaptive Tune - Gain Scheduling
Communications	Protocol - Resolution - Parity
Outputs	Cool Type - Analogue Outputs (Units,Scale)- Pulse Burners
Inputs	Filtering- Sampling- CJC Type - Input sense (normal/inverted) - Derived Inputs
Programs	Sub-Programs - Holdback availability - Digital Outputs- Fast Run availability
Units	Inputs - PID Parameters - Ramps
Totalisers	
Sense of Inputs/Outputs	Normal - Inverted
User Wiring	Availability - Calculated Values -Screens
VP Feedback Potentiometer	Loop 1 or Loop 2
Timers	Function - Inputs - Wiring

Table 5-1

SUB - MENU	CHANGES POSSIBLE IN INSTRUMENT CONFIGURATION
Instrument Type	Single Loop - Cascade - Controller - Programmer - etc
Inputs	Sensor - Linearisation - Scale - Display Range
Remote Inputs	Linearisation - Scale - Display Range
Slot Occupancy	
Slot Function	Power Retransmission - Control Output Loop 2 - etc
Digital Input Function	Auto/Manual - Keyboard lock - etc
Control Defn	On/Off - PID - Valve Positionner
Ratio	Multiply - Divide

Table 5-1 (Cont)

FUNDAMENTAL OPERATIONS

Accessing Configuration Mode

* Turn off the power supply to the instrument.
* Press PAGE and VIEW together while restoring the power supply to the instrument.

The following display will appear for a few seconds:

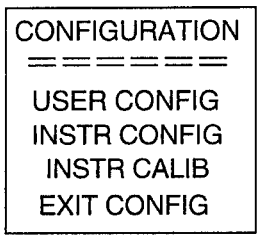
Next, the instrument will display this screen:

The 'password' is a number from 0 to 9999. You will need to enter it using the Δ ∇ keys. Press VIEW when the password has been correctly entered.

Note: The password of all controllers is set to '0' in the factory.

If you forget the password, you will be able to find it listed in Level 3 in the UI SECURITY menu.

The main configuration menu will appear :



The name of the first menu 'USER CONFIG' will be highlighted.

Selecting a Sub-Menu or a Menu

* Highlight the name of the menu required using ⟳
* Press VIEW to select it.

Selecting an Option or Setting a Value

* Press Δ or ∇.

Returning to the Preceding Sub-Menu or Menu

* Press PAGE

CONFIGURATION OF CONTROLLER/PROGRAMMER OPTIONS

For more information on fundamental operations, please see the preceding section.

Process Inputs

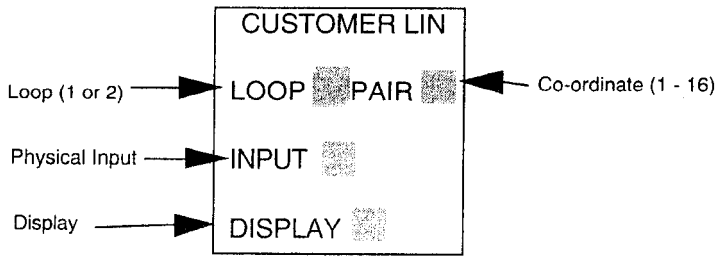
Sensor

The choice of sensot type is made in the Instrument configuration menu (INSTR CONF). The sensors are divided into 3 main groupings:

* thermocouples (TC), Resistance Thermometers (RT) et pyrometers : the selection of this type of sensor is made in the LINEAR DEFIN sub-menu.

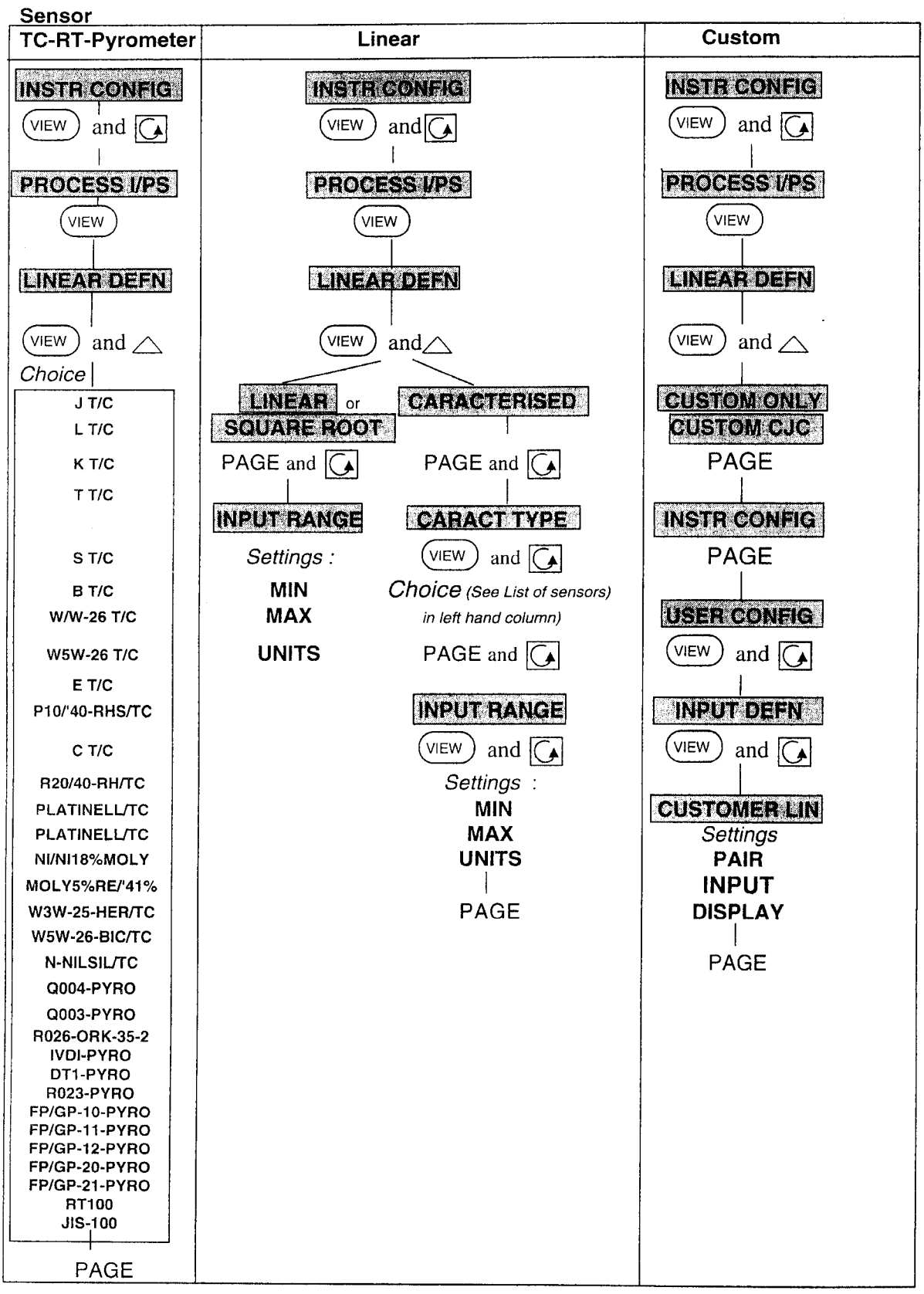
* linear inputs: To use a simple linear input, select LINEAR.
For a signal for which you wish to use the square root of the value, select SQUARE ROOT. For non-linear signals (for example a thermocouple), you will need to select CARACTERISED; to choose the actual linearisation table to use, select: CARACT TYPE. For linear input types, you will also need to specify the minimum and maximum range of the sensor and its units using the INPUT RANGE sub-menu.

* Custom Linearisation
If your sensor does not appear in the 'LINEAR DEFN' list, you will need to select 'CUSTOM ONLY' (custom curve without CJC), or 'CUSTOM CJC' (custom curve with CJC). Selection of this option will allow you to enter a set of co-ordinates for the linearisation curve using the CUSTOMER LIN sub-menu from the 'USER CONFIG' menu:

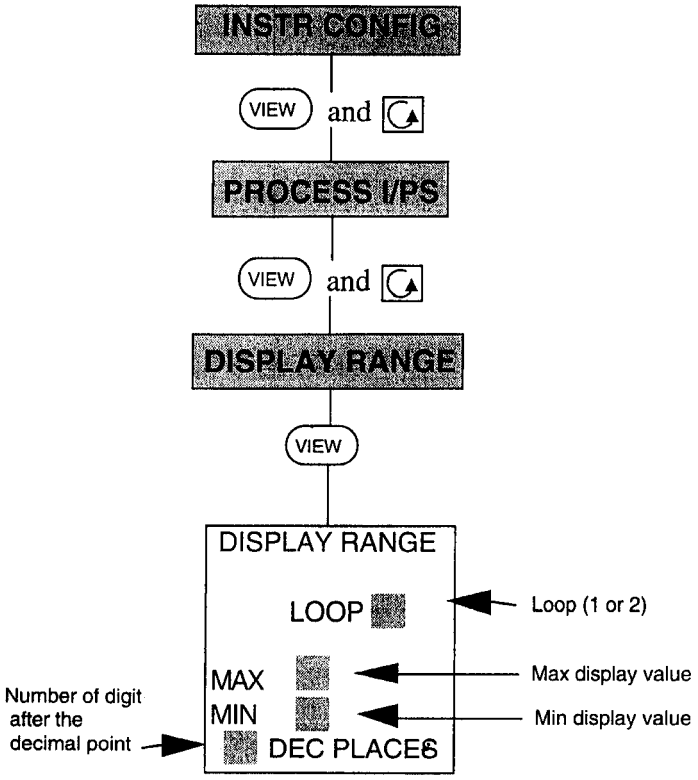


The linearisation curve is defined by 16 points. Each point (PAIR), requires the value given by the input (INPUT) and the corresponding value in display units (DISPLAY).

Move from one parameter to the other using [C▲] and set the values using Δ or ∇.

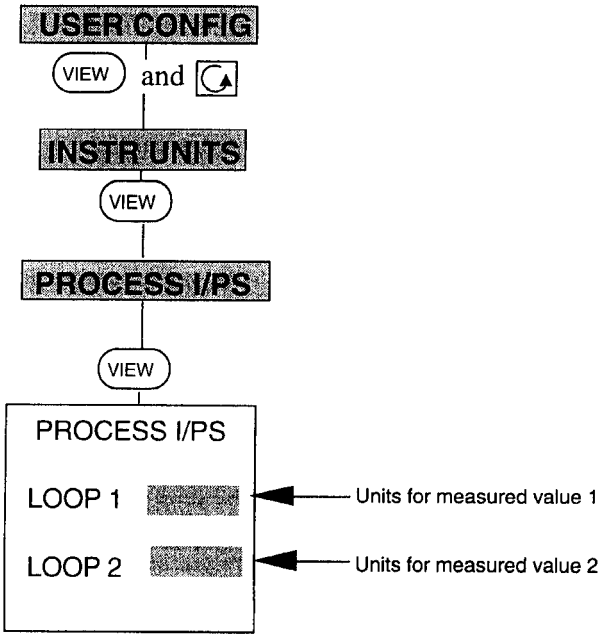

Sensor
TC-RT-Pyrometer
Linear
Custom
INSTR CONFIG
VIEW and
PROCESS I/PS
VIEW
LINEAR DEFN
VIEW and
Choice
J T/C
L T/C
K T/C
T T/C
S T/C
B T/C
W/W-26 T/C
W5W-26 T/C
E T/C
P10/'40-RHS/TC
C T/C
R20/40-RH/TC
PLATINELL/TC
PLATINELL/TC
NI/NI18%MOLY
MOLY5%RE/'41%
W3W-25-HER/TC
W5W-26-BIC/TC
N-NILSIL/TC
Q004-PYRO
Q003-PYRO
R026-ORK-35-2
IVDI-PYRO
DT1-PYRO
R023-PYRO
FP/GP-10-PYRO
FP/GP-11-PYRO
FP/GP-12-PYRO
FP/GP-20-PYRO
FP/GP-21-PYRO
RT100
JIS-100
PAGE
LINEAR or SQUARE ROOT
CARACTERISED
PAGE and
INPUT RANGE
Settings :
MIN
MAX
UNITS
CARACT TYPE
Choice (See List of sensors) in left hand column)
INPUT RANGE
Settings :
CUSTOM ONLY
CUSTOM CJC
INSTR CONFIG
USER CONFIG
INPUT DEFN
CUSTOMER LIN
Settings
PAIR
INPUT
DISPLAY

Display Range

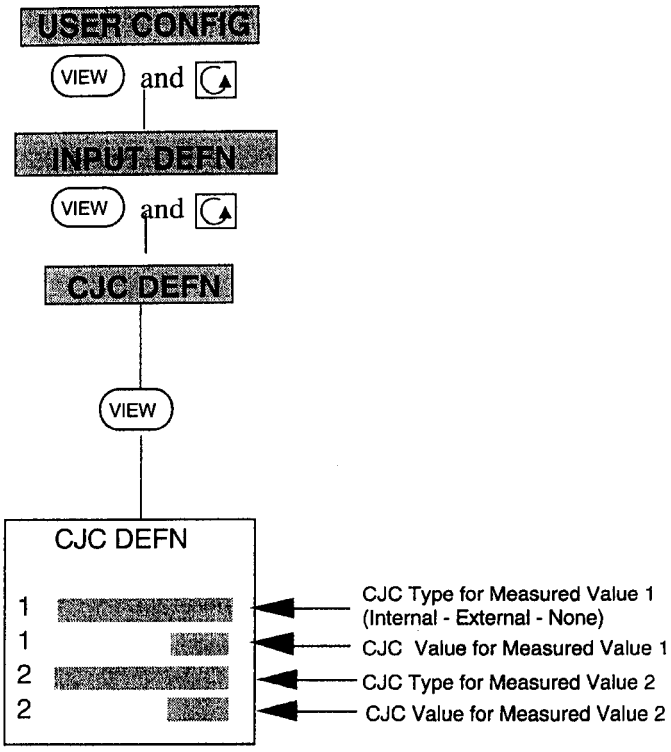


Move between parameters using , and set them using △ or ▽.

Display Units

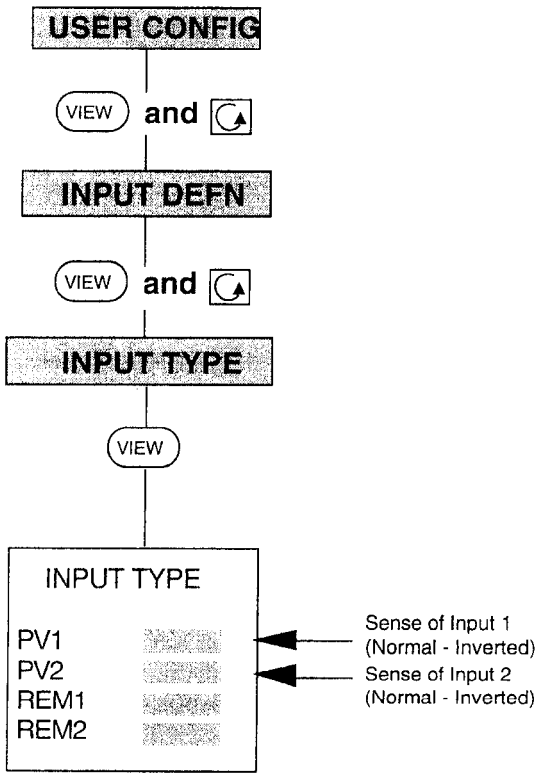


CJC


USER CONFIG
VIEW
and
INPUT DEFN
VIEW
and
CJC DEFN
VIEW
CJC DEFN
1
1
2
2
CJC Type for Measured Value 1
(Internal - External - None)
CJC Value for Measured Value 1
CJC Type for Measured Value 2
CJC Value for Measured Value 2

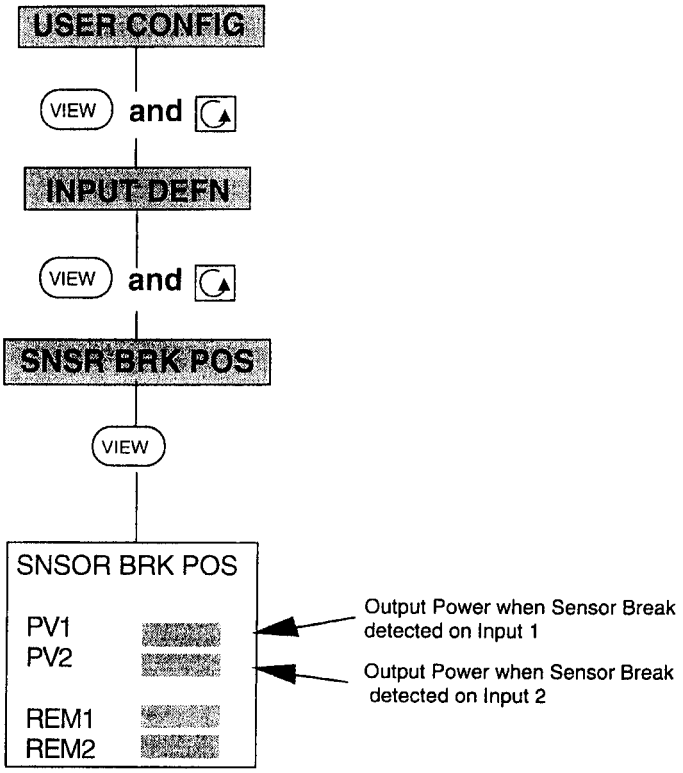
Input Type (Sense)

This characteristic defines the 'sense' of changes in the input signal with respect to the display range.
When the minimum signal from the sensor corresponds to the minimum of the display range, you must choose a NORMAL input.
When the minimum signal from the sensor corresponds to the maximum of the display range, you must choose an INVERTED input (e.g. Input is 10 - 0V, display value 0 - 1000 units).



Sensor break

This characteristic allows you to set the value of the process input at which the instrument will consider that a sensor break condition has occurred.



Derived Inputs

Derived inputs allow simple mathematical operations to be performed on the measured value. This function is available if your 900 EPC has been configured for use with derived inputs:

To do this, check that the INSTRUMENT type sub-menu from INST CONFIG has been configured to one of the following instrument types (chapter 5): DERVD DUAL LP - DERVD SING LP - DRVD SING PG - DRVD DUAL PG.

In each case, 2 process inputs are required. The function is particularly useful when control is to be performed using a differential between the two inputs or using an average of two inputs. The formula used is as follows (see also the diagram below).

PV1 = a1.IP1 + b1.IP2

The control channel is channel 1. PV1 is the value used by the loop 1 PID.

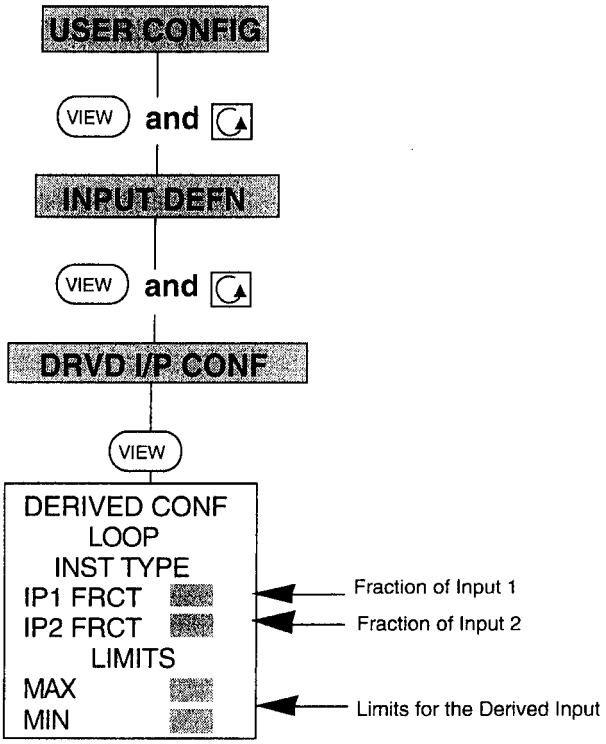
IP1 is the measured value from channel 1; IP2 is the measured value from channel 2.

a1 : FRCT IP1

b1 : FRCT IP1

a1 and b1 may be set between -1.000 and +1.000

PV2 = a2.IP1 + b2.IP2
The control channel is channel 2. PV1 is the value used by the loop 2 PID.
IP1 is the measured value from channel 1; IP2 is the measured value from channel 2.
a2 : FRCT IP2
b2 : FRCT IP2
a2 and b2 may be set between -1.000 and +1.000.



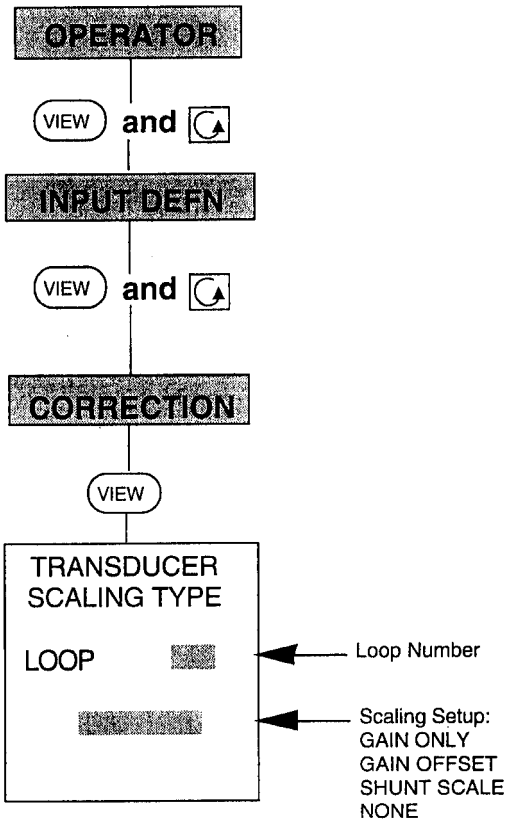
Examples :
* To perform differential control on loop 1, set
a1 = 1.00 and b1 = -1.00
This gives :
X1 = IP1 - IP2
* To perform control based on the average of the two inputs:
a2 = 0.5 and b2 = 0.5
giving:
X2 = 0.50 IP1 + 0.50 $\qquad$ IP2 = $\frac{IP1 + IP2}{2}$

Transducer Scaling

When using transducers as input sensors, it is often necessary to perform a recalibration operation when a transducer is replaced. In order to avoid such an operation, the 900 EPC provides a rescaling operation.

This rescaling operation can be of one of the following three types:

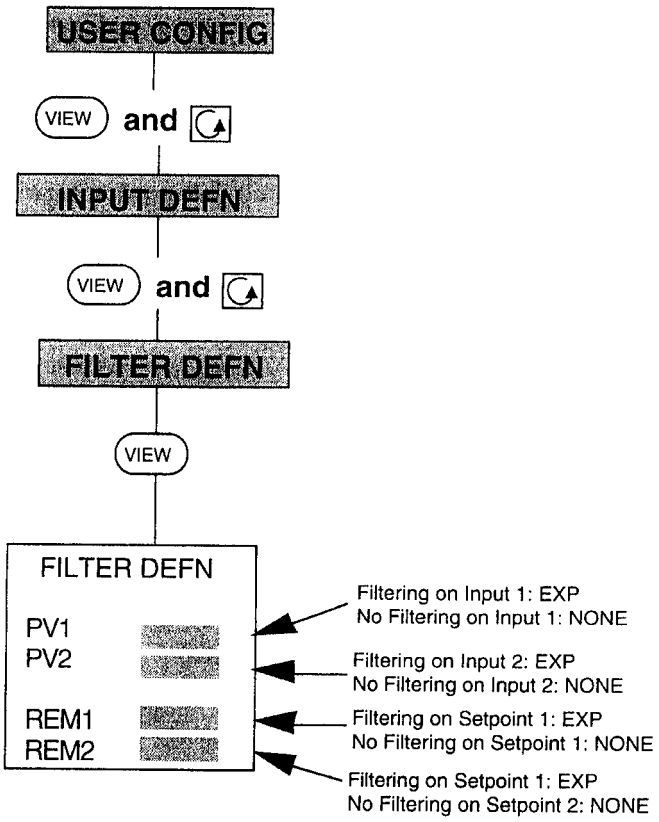
Gain Only - Gain and Offset - Shunt



The actual rescaling operation is performed in operator mode.

Filtering

When the input sensor is in an environment where it is subject to electrical noise, it may be necessary to provide input filtering using a first order exponential filter.
In such cases, choose EXP, otherwise, if no filtering is required : NONE



Control Setpoints

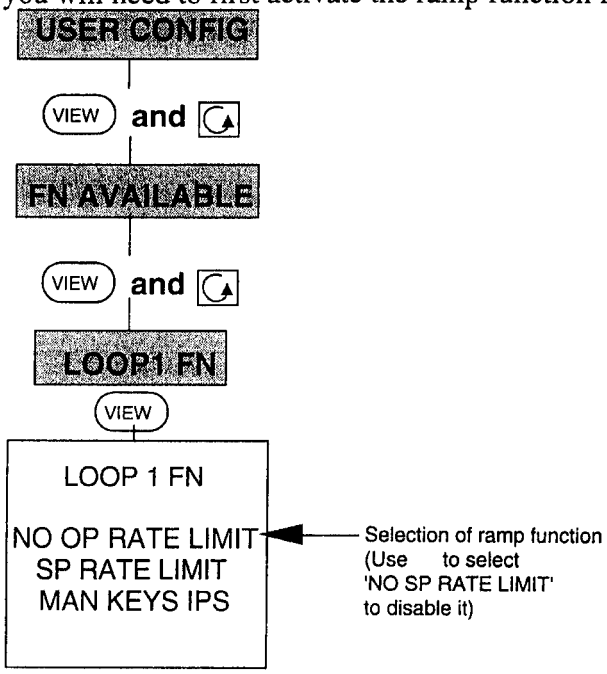
Internal Setpoints

Two internal setpoints are available as standard for each control loop.

Ramp

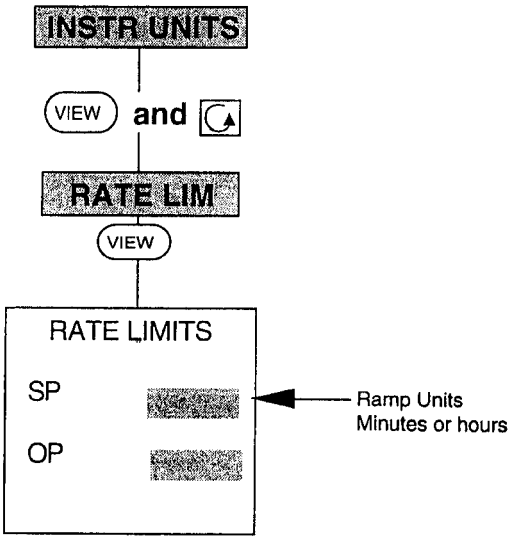
To avoid rapid changes in the measured value when the setpoint is changed, it is possible to make the setpoint ramp gradually to its required value.

* To allow operation in this way, you will need to first activate the ramp function feature.



To activate the ramp function, select **SP RATE LIMIT** with Δ or ∇ .

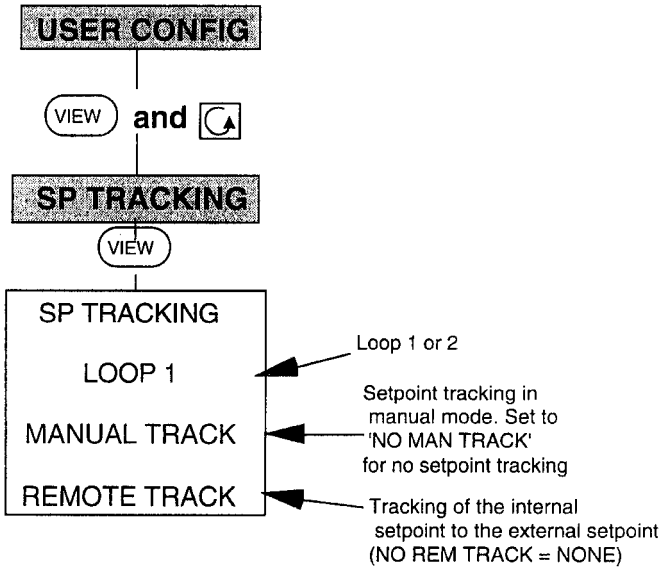
* Then press PAGE twice and select using



The ramp settings themselves are made in operator mode.

Setpoint Tracking

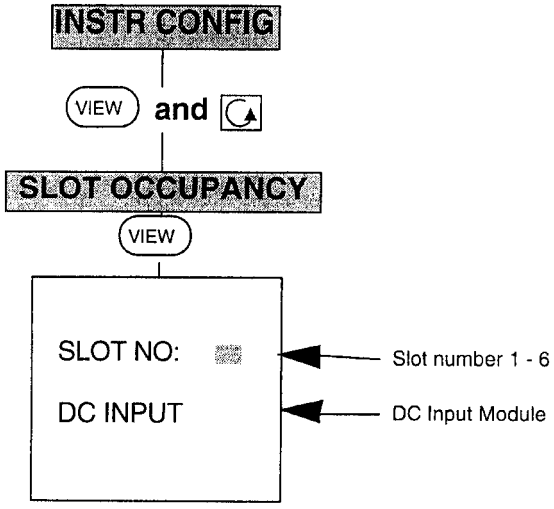
In order to ensure a bumpless transition from manual to automatic mode, the setpoint may be set to track the measured value when manual mode is selected.
The internal setpoint may also be set to track the remote setpoint to avoid bumps when changing the setpoint. In the same way, when using cascade control, the working setpoint may be set to track the cascade setpoint (CASCADE TRACK), and for ratio control, the working setpoint may be set to track the ration setpoint (RATIO TRACK). These options are set on the SP TRACKING sub-menu.



Remote Setpoint

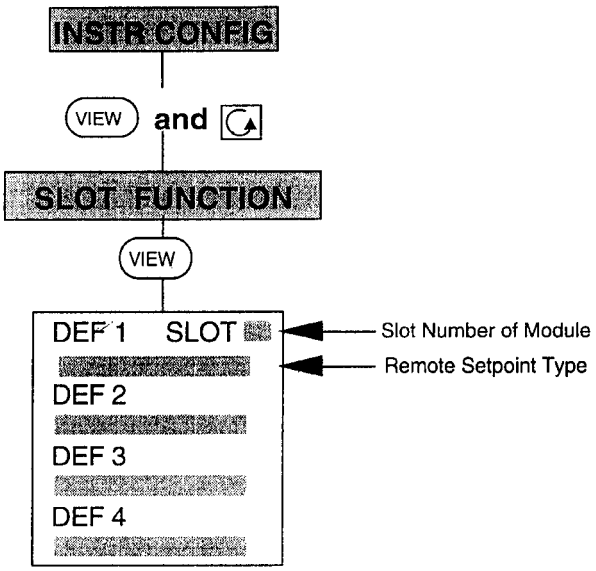
Presence of Remote DC Input Module

Remote setpoints are only available if your 900 EPC is fitted with a DC Input Module. You may check this using the SLOT OCCUPANCY sub-menu.



Remote Setpoint Function

You should next verify the function of the DC Input module using the SLT FUNCTION sub-menu.

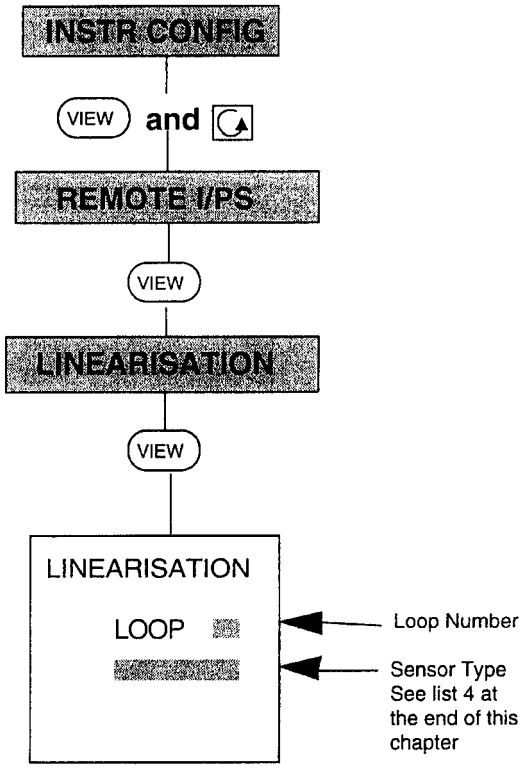


The remote setpoint can be one of the following :

- an independant control setpoint: choose REMOTE SP L1 (for loop 1), or REMOTE SP LP2 (loop 2), using Δ or ∇ .
- a setpoint trim : choose REM SP TRM LP1 (for loop1), or REM SP TRM LP2 (for loop 2) using Δ or ∇
- a ratio trim : choose RATIO SP TRIM, using Δ or ∇

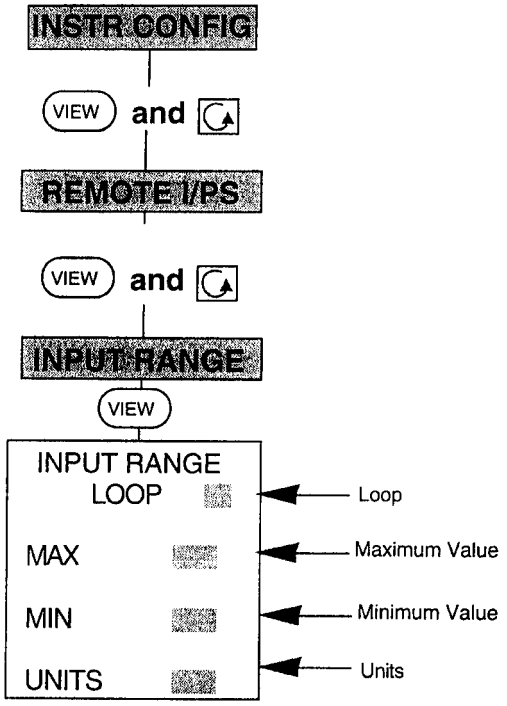
Remote Setpoint: Linearisation

If the signal forming the remote setpoint is non-linear, you may use a linearisation table using the same table as that used for sensors.



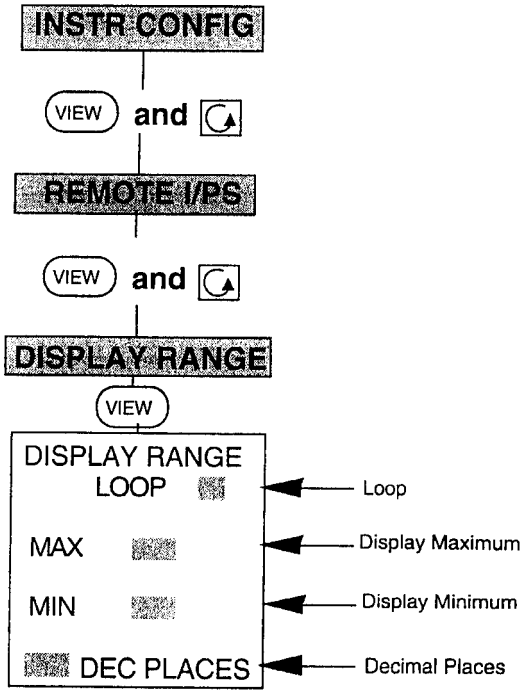
Remote Setpoint: Input Range

It is necessary to set the minimum and maximum values for the remote setpoint using the INPUT RANGE sub-menu.



Remote Setpoint: Display Range

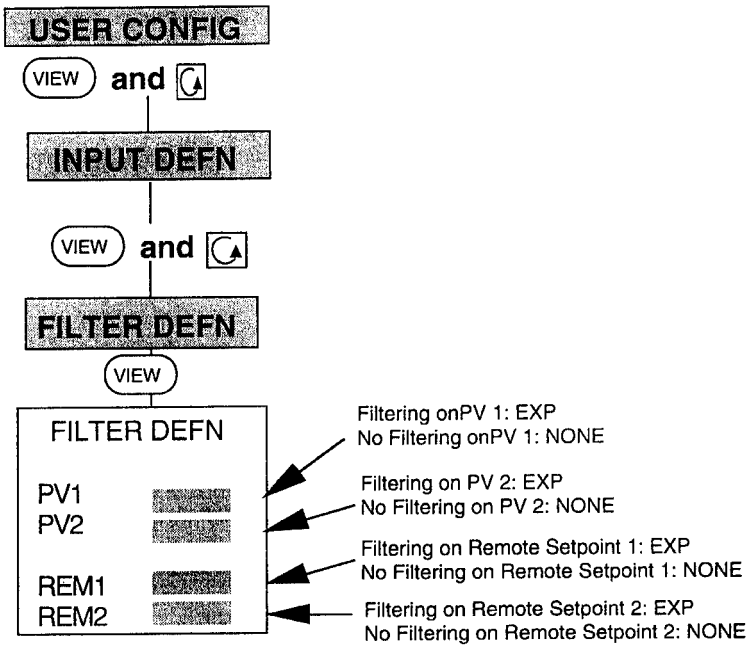
It is necessary to set the minimum and maximum displayed values for the remote setpoint using the INPUT RANGE sub-menu.



Remote Setpoint: Filtering

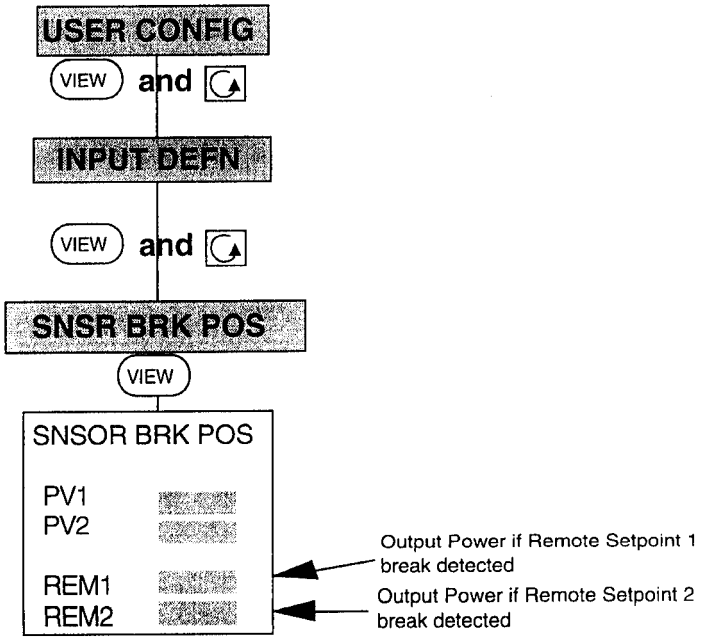
In situations where the sensor is situated in an electrically noisy environment, or where there is a long settling time, it is necessary to filter the remote setpoint signal using a first order exponential filter.

In this case you should chose EXP, otherwise, if you do not want filtering, chose NONE



Remote Setpoint: Sensor Break

This option allows you to set the value of the remote setpoint at which the instrument will assume a sensor break condition.



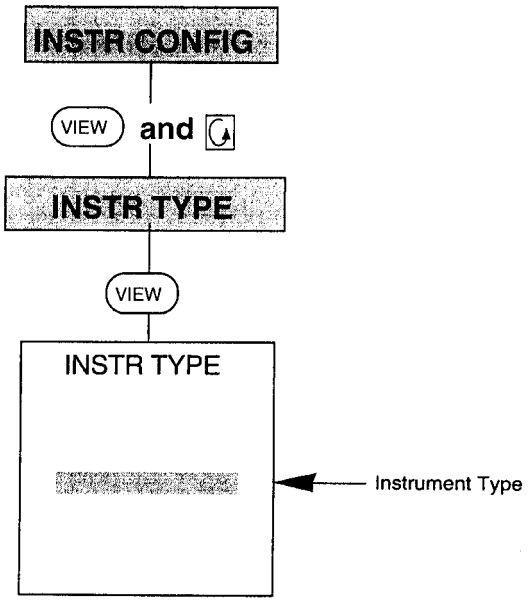
Control

Instrument Type

Each instrument type provides a distinct type of control. The instrument that you have received will have been pre-configured for your application following the definition specified by the order code.

However if you subsequently wish to use your controller in a new application, you will need to ensure that the instrument type corresponds to the control type required, and change it if required.

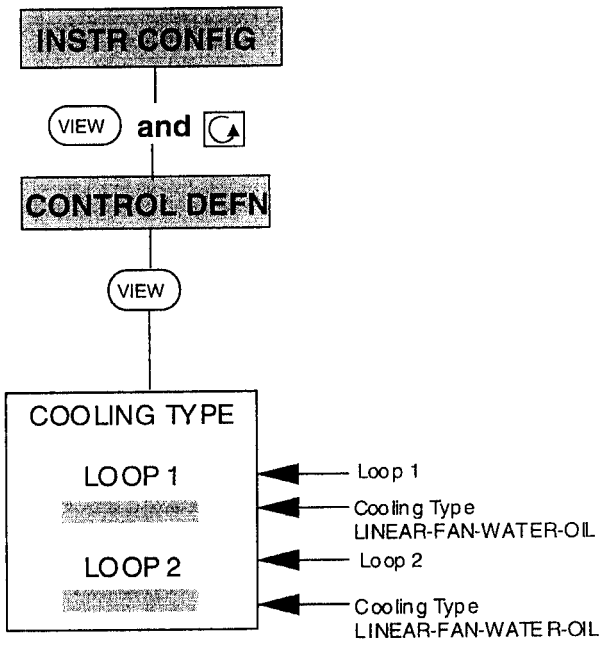
IMPORTANT:Note however that certain changes to the instrument type may not be made in configuration mode, such as the change from a controller to a programmer, or from a single to a dual loop instrument.



For further information on the different instrument types, please refer to the list at the end of this chapter.

Control Definition

When changes are made to an installation (changes to an actuator, for example), it is sometimes necessary to change the control definition.



You may define the control action for each loop of control:

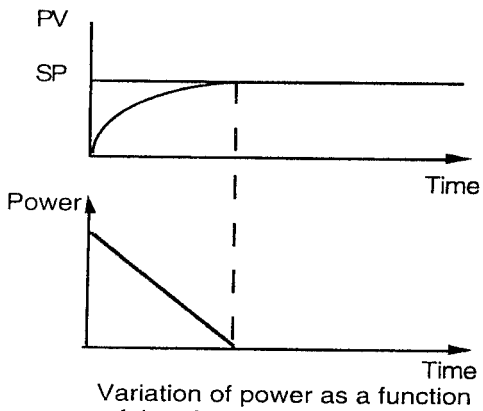
PID-OP1 ONLY : Single Action (e.g. heat only) P.I.D
PID-OP1&OP2: Dual Action (e.g. heat/cool) P.I.D
ON/OFF-OP1&2: Dual Action On/Off control
ON/OFF-OP1: Single Action On/Off control
VP-OP1 ONLY : Single Action Valve Positioner (*)
VP-1&PID-2 : Dual Action : One Valve Positioner (*) and one P.I.D
P.I.D-1 & VP-2 : Dual Action : one P.I.D, and one Valve Positioner (*)
VP OP1 & 2 : Dual Action Valve Positioner (*)

***NB** The selection of P.I.D. or valve positioner control is also configured by means of hardware jumpers on the relay and triac modules. It is essential that you refer to the section on relay or triac outputs that follows below if you wish to make such a change.

Sense of Control

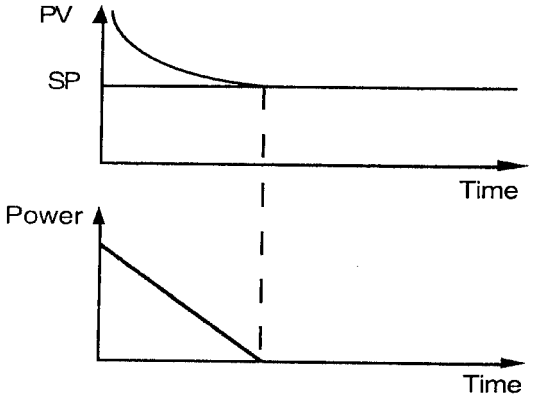
Once the control type has been defined, you must determine whether the sense of the control action is to be reversed or direct.

Reverse Action : When you require the measured value to vary as a function of the inverse of the applied power, you should chose a reverse action.
Example: When controlling temperature, a reversed output is used for the heat channel.



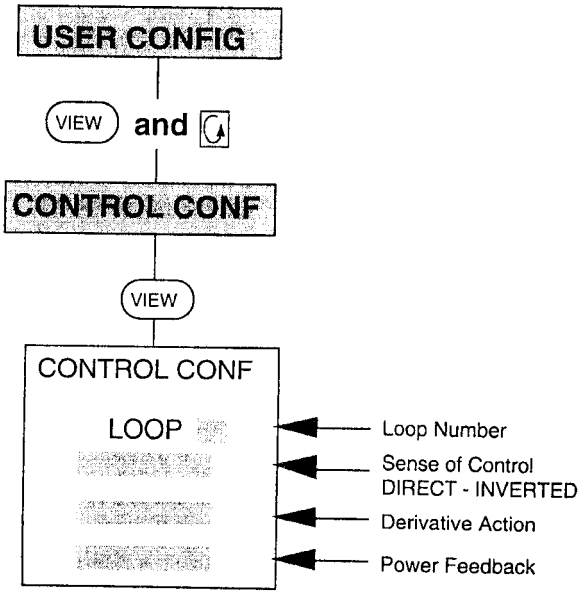
Variation of power as a function of time forreverseacting inputs

Direct Acting : When you require the measured value to increase as the applied power increases, choose a direct action.
Example : when controlling temperature the cool channel is direct acting.



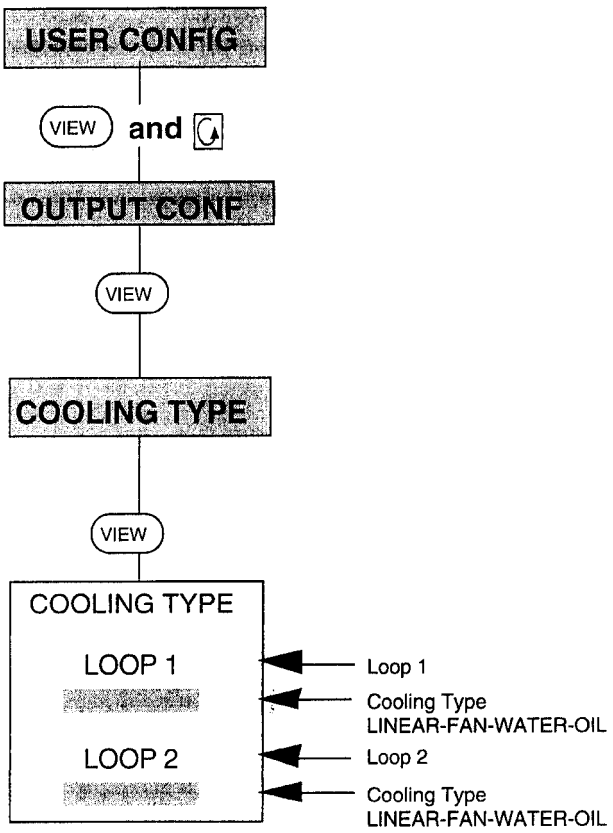
Variation of power as a function of time for direct acting inputs

You may define the sense of the first control action in the **CONTROL CONF** menu. If a second action has also been configured, its sense is automatically set to the inverse of the first.



Cooling Type

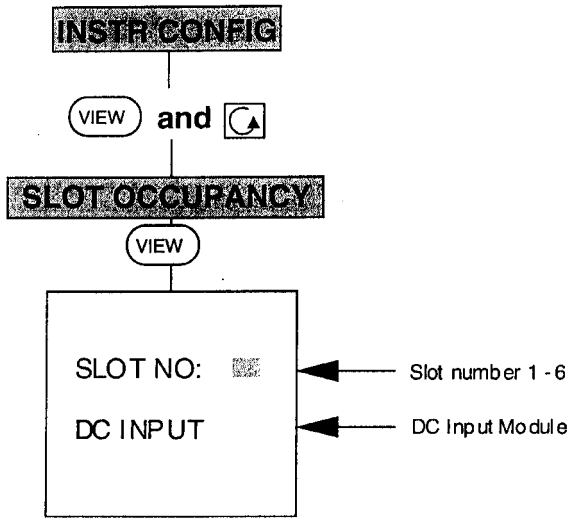
It is possible to choose the cooling algorithm used for cool outputs: linear (LINEAR), water (WATER), oil (OIL), or fan cooling (FAN)



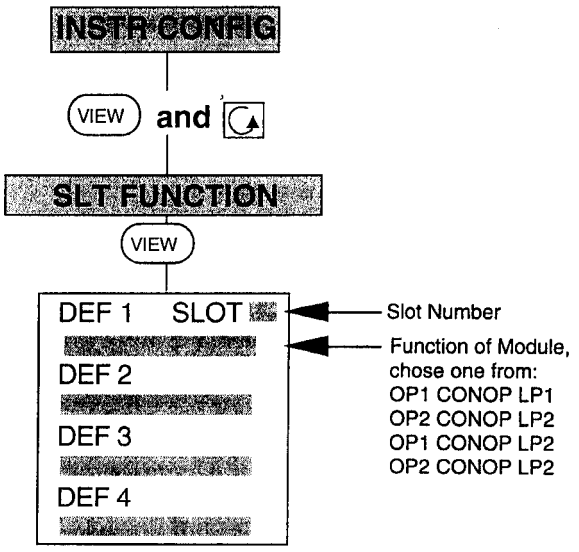
Assigning Control Modules to a Control Function

The next configuration procedure is to assign the control output modules purchased to perform a specific function in the installation (e.g. heater outputs, opening/closing of a valve) to the control function of the instrument.

* As a prerequisite, you must view and check the module types installed in the instrument.



* Next you need to assign a control function to each module.



OP1 CONOP LP1 : Control Output for action 1, Loop 1
OP2 CONOP LP1 : Control Output for action 2, Loop 1
OP1 CONOP LP2 : Control Output for action 1, Loop 2
OP2 CONOP LP2 : Control Output for action 2, Loop 2

Output Sense

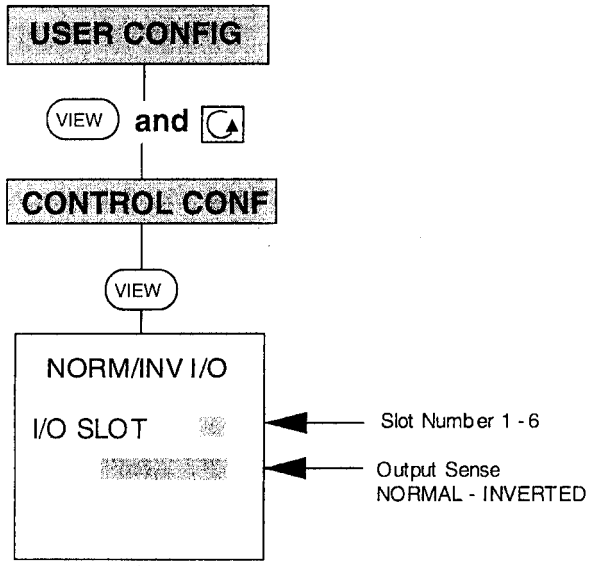
A sense can be configured for each physical output:

* Normal (NORMAL) :

The output signal varies in the same sense as the power demand from the controller
Example : Analogue Output 0-10V
For 0% Output power demand, Output = 0V
For 100% Output power demand, Output =10V.

* Inverted (INVERTED)

The output signal varies as the inverse of the power demand from the controller
Example : Analogue Output 0-10V
For 0% Output power demand, Output = 10V
For 100% Output power demand, Output =0V.



Example

For an application containing 2 independent control loops:

-A heat/cool control loop: Analogue/Relay

-A Triac Valve Positioner (heating action)

Your 900 EPC should have the following configuration:

*Instrument type: INSTR TYPE-----> DUAL LP CONT

*Control definition : CONTROL DEFN------> LOOP 1 : PID-OP1&OP2
LOOP 2 : VP-OP1 ONLY

*Control Sense CONTROL CONF ------> LOOP 1 : REVERSE
------> LOOP 2 : REVERSE

The second control action will automatically be defined in the opposite sense to the first, in this case, the second action of loop 1 will be configured as DIRECT.

*Assignment of output module to control function:

SLOT OCCUPANCY -------> SLOT -NO 3 : DUAL TRIAC (Loop 2)
SLOT -NO 4 : DC CONTRL (Loop 1)
SLOT - NO 5 : DUAL RELAY (Loop 1)

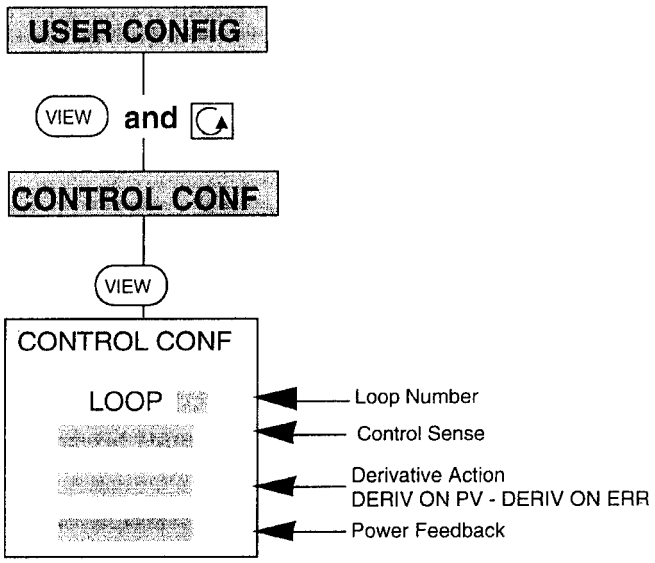
SLT FUNCTION ---------> DEF1 SLOT 3 : OP1 CONOP LP2
(Triac output assigned to the valve positioner control on loop 2)

DEF 1 SLOT 4 : OP1 CONOP LP1
(DC Output assigned to the reverse acting PID control on loop 1)

DEF 1 SLOT5 : OP2 CONOP LP1
(Relay output assigned to the direct acting PID control on loop 2)

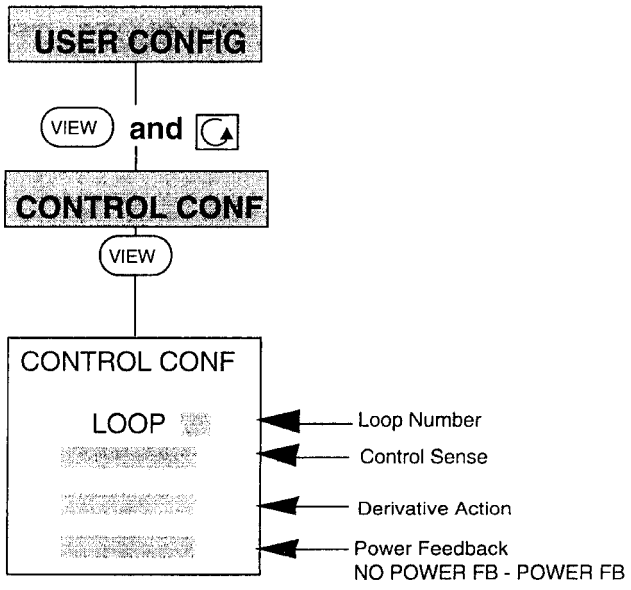
Derivative Action (Error or Measured Value)

The derivative action may be based on the 'Error' (difference between the measured value and setpoint) or on the measured value. Basing it on the measured value prevents large changes of output when large step changes of setpoint occur. The default configuration is that the derivative action is based on the error.



Power Feedback

Provided that the power supply to the instrument is subject to the same variations, this option permits compensation for supply variations present at the terminals of the load.



Output Power Limits

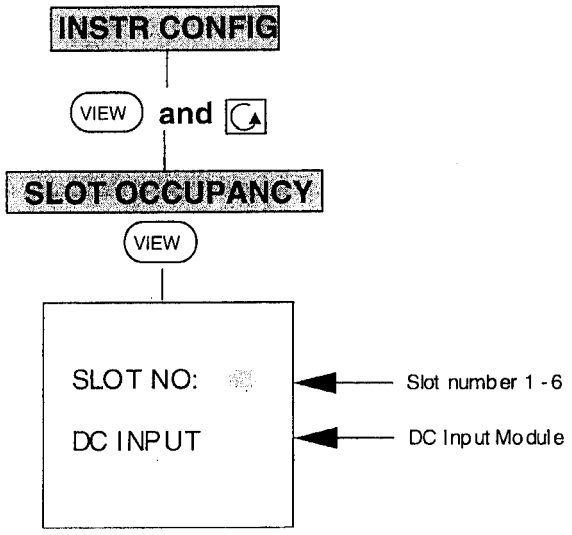
In certain cases it may be necessary to limit the power supplied to the load (for example when the maximum power that can be dissipated by the load is less than its nominal maximum).

This limitation can be provided in different ways:

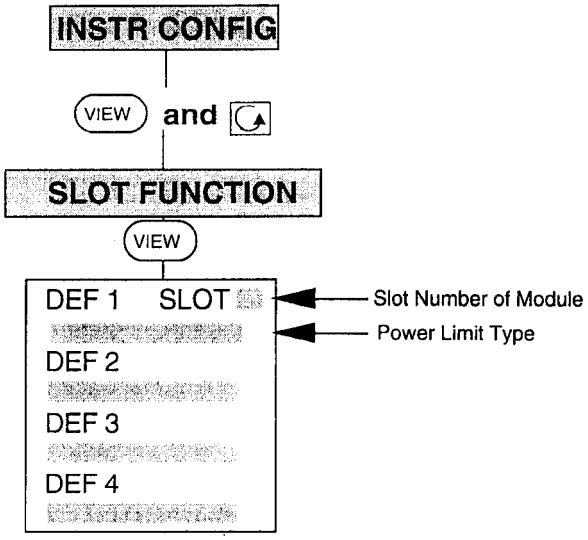
- Internal limitation which is always available as standard: no configuration is required therefore: settings are made in operator mode.
- External Limitations: requires a DC Input module

External Power Limits

* It is first necessary to ensure that the DC Input module is present in the SLOT OCCUPANCY sub-menu.



* You should then assign the DC Input module to a function, using the SLOT FUNCTION sub-menu.



There are several different possibilities for this function:

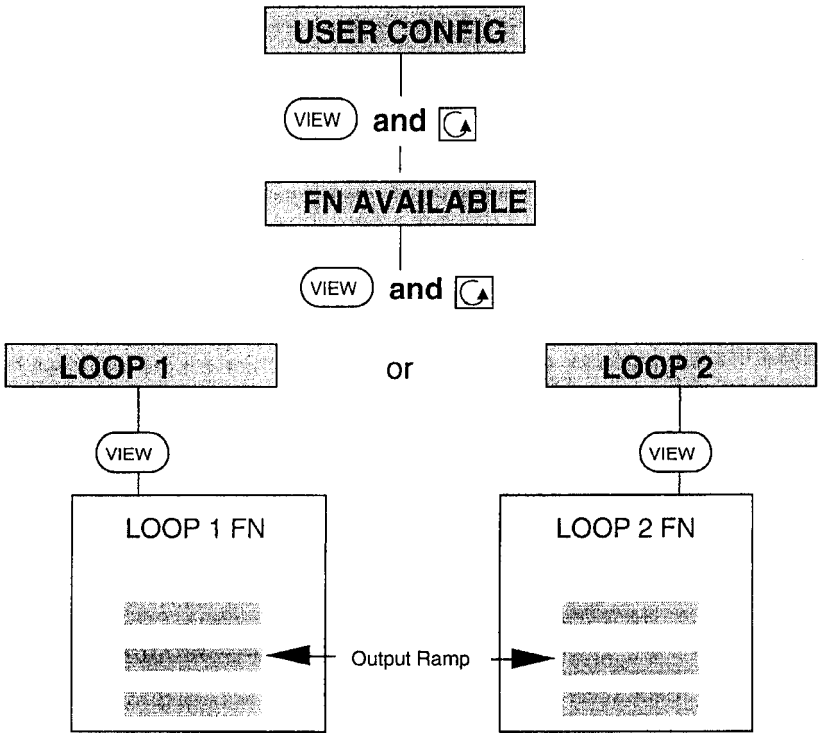
- OP1 PWRLM LP1 : Power Limit in Auto mode for output 1 of loop 1
- OP1 PWRLV LP1 : Power limit in Auto mode and Level in Manual for output 1 of loop 1
- OP1 PWRLM LP2 : Power Limit in Auto mode for output 1 of loop 2
- OP1 PWRLV LP2 : Power limit in Auto mode and Level in Manual for output 1 of loop 2

Setpoint Ramp

Certain low inertia processes require that the output should be changed progressively. Three settings have therefore been provided:

- NO OP RAT LIM : no ramp: the output does not change progressively
- ORL AUTO ONLY : output ramp only in auto mode
- ORL ALWAYS : output ramp in both auto and manual mode

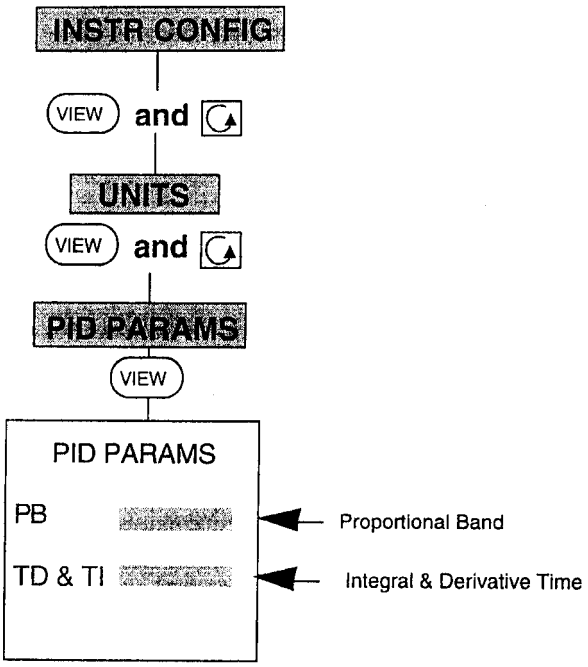
For dual loop instruments, the setpoint ramp is set independently on each loop using the FN AVAILABLE sub-menu.



If a ramp has been selected (ORL AUTO ONLY - ORL ALWAYS), you must also set the ramp units : see next section.

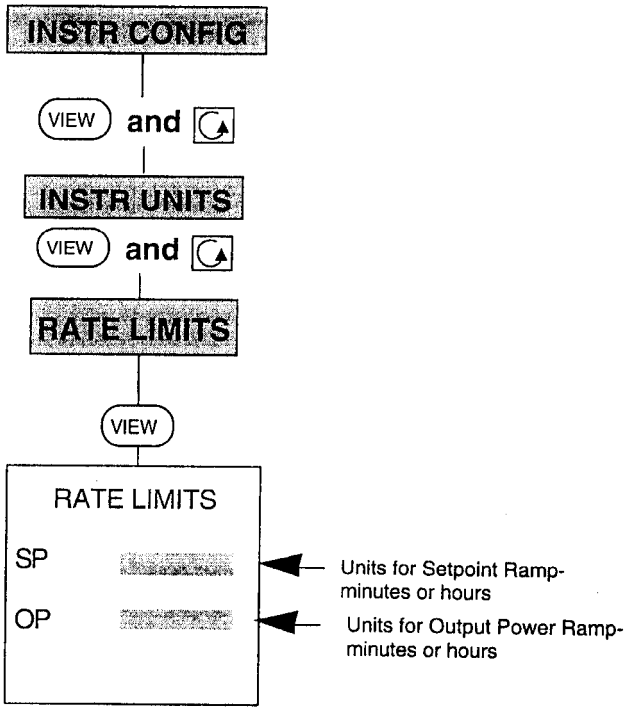
P.I.D. and Ramp Units

* P.I.D Parameters



The proportional band may be expressed in % of the instrument span (% SPAN) or instrument units (ENG UNITS). The integral and derivative times (TD and TI) may be expressed in minutes or seconds.

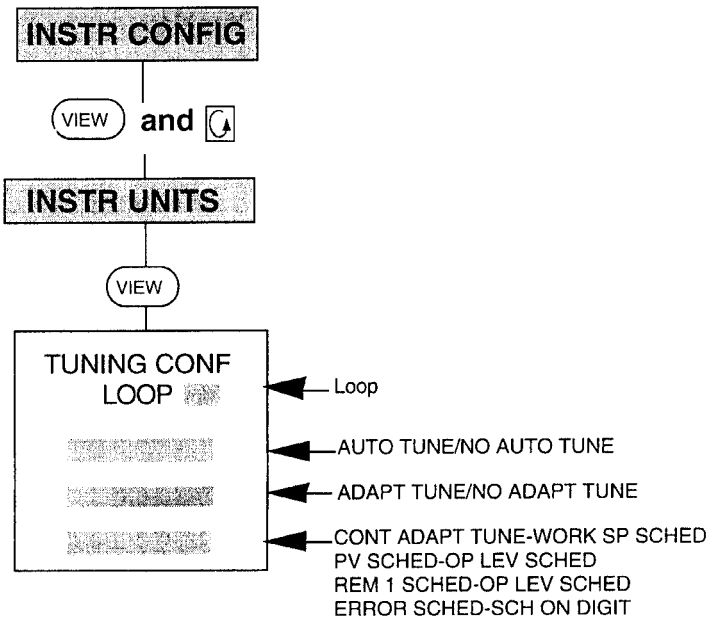
* Setpoint Ram



Autotune algorithms and Gain Scheduling

Two tuning algorithms are provided:

- AUTO TUNE: A tuning method that frees the user from the caculation of control parameters during commissioning.
- ADAPT TUNE: An adaptive tuning method that allows PID values to be calculated automatically whilst operating (CONT ADT TUNE). This is also available to calculate PID values in specific zones, delimited either in terms of the internal setpoint (WORK SP SCHED), a remote setpoint (REM 1 SCHED - REM 2 SCHED), the error (ERROR SCHED) the measured value (PV SCHED), the output power (OP LEV SCHED), a digital input (SCHED ON DIGIT), or selected using the front panel.

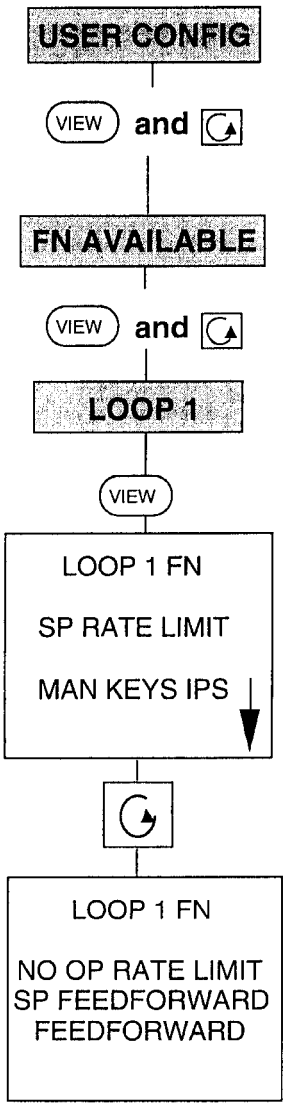


Note : If you wish to use Gain Scheduling, you MUST select ADAPT TUNE in the second line.

Function Selection

A number of functions which are available as standard may be selected using the **FN AVAILABLE** menu, These are:

- The SP ramp function SP RATE LIMIT (see this chapter 5)
- Availability of the Manual Function (*)
- The Remote Setpoint (*)
- Output Power Ramping: OP RATE LIM (see this chapter 5)
- Setpoint or Measured Value Feedforward for Cascade (*)
- Output Feedforward (*)



In each case, use the keys Δ or ∇ to select the required option.
For manual mode, you may choose between : NO MAN FUNC (Manual disabled)

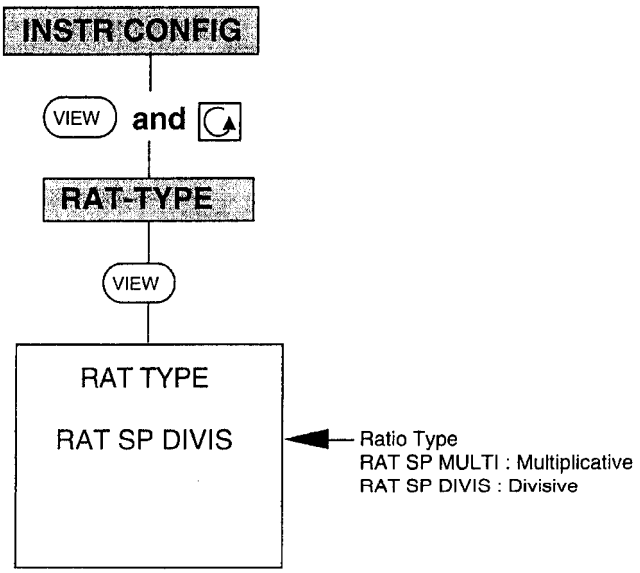
MANUAL FUNC (manual function available), MAN KEYS IPS (manual mode available via keyboard or digital inputs), MAN IPS ONLY (manual mode only available via digital inputs), FRCD IPS ONLY (manual mode forced by digital inputs), FRCD KEYS IPS (manual mode forced by keypad or digital inputs).

* For feedforward of the setpoint, choose SP FEEDFRWD, on the measured value: PV FEEDFWRD, or for no feedforward: NOSP/PV FEEDFWRD.
* Select FEEDFORWARD if you wish to use feedforward, or NO FEEDFORWRD if you do not wish to use it.

Ratio Control

If your 900 EPC has been configured for ratio control (see this chapter 5), you may use the RAT-TYPE menu to set the ratio type:

- The coefficient is multiplicative: RAT SP MULTI
- The coefficient is a divisor : RAT SP DIVIS



Choose the required option using Δ or ∇

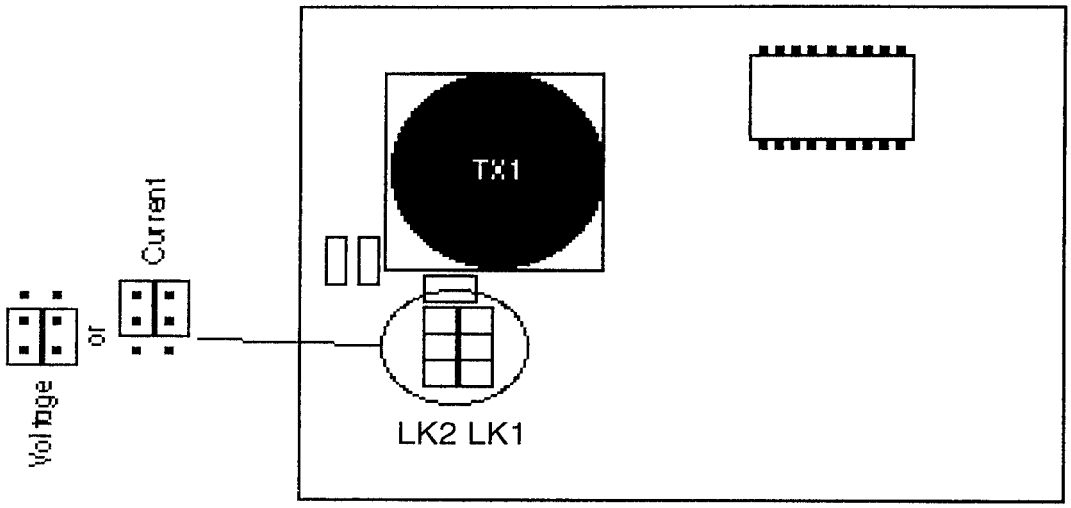
Control Output Modules

You may determine which modules are fitted by reference to the SLOT OCCUPANCY sub-menu from the INSTR CONFIG menu.

DC Output

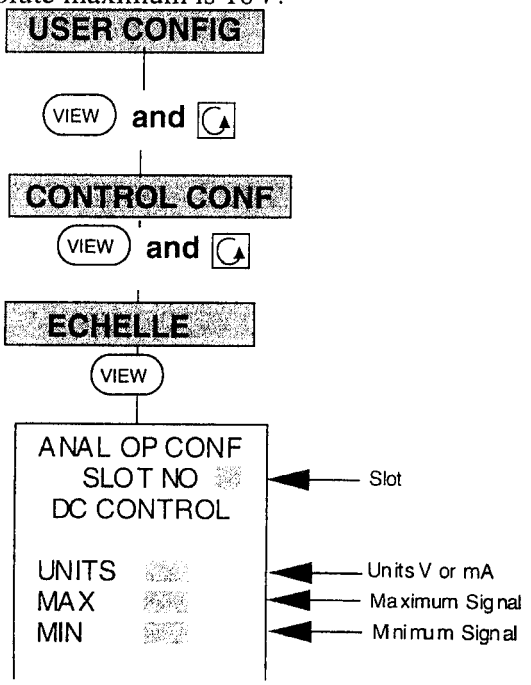
Voltage or Current

The selection of a voltage or a current signal is made using 2 jumpers on the DC Output module.



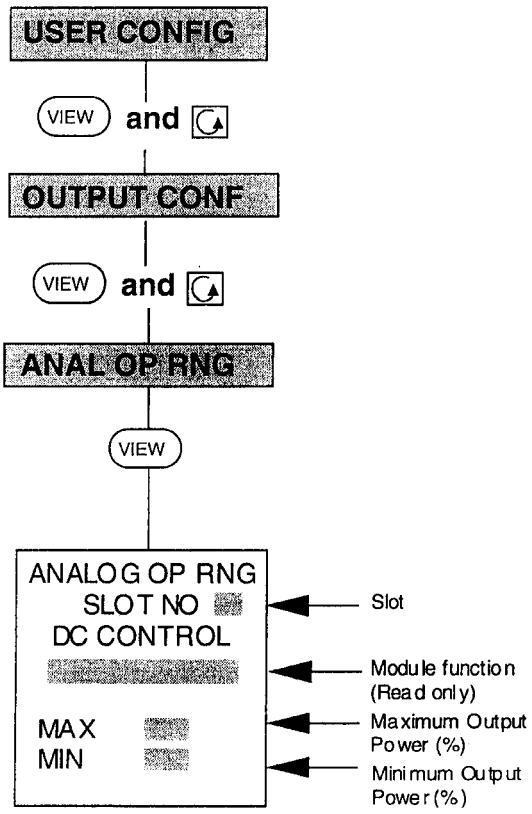
Units and Scaling of the Signal

You will next need to define the units and the minimum and maximum of the output signal.
For current signals, the absolute maximum is 20mA.
For volrage signals, the absolute maximum is 10V.



Output Range Limiting

It is possible to limit the analogue signal from the ANAL O/P RNG menu:



Example :
Assume that you are using two heaters: the first as a primary heater, and the second to provide additional heat.
The first works with limits of 0 to 60% , and the second between 60% to 100%.

Note : If you do not require output limiting, simply set:
MIN = 0 and MAX = 100

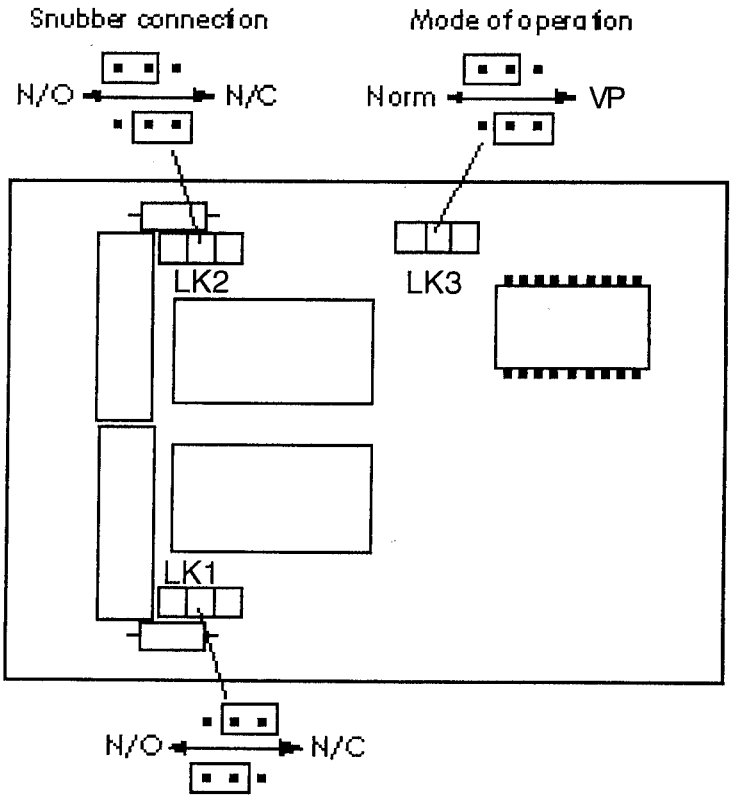
Relay Output

Control Mode: "Normal" or Valve Positioner

When using relay modules, it is necessary to configure the module type. This is done using the LK3 link: see diagram below.

Protecting the Contacts with an RC Network

If the relay is to switch an inductive load (mechanic conductor or coil), it is essential to provide an RC network on the contact of the output relay (*). An RC Circuit (R = 100 Ω, C = 22nF) is provided on relay modules. It may be connected to the normally open (N/O) or the normally closed (N/C) contact: the choice is made using the links LK1 (relay 1) and LK2 (relay 2).

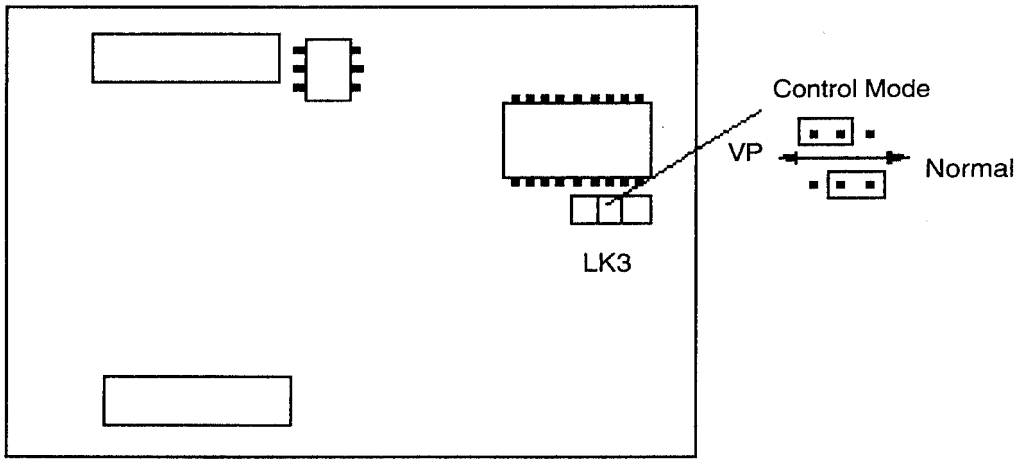


(*) : The RC Network draws 1mA at 120V AC and 2mA at 240V AC, which is sufficient to energise the coil of certain high impedance relays: in such cases, you must not connect the RC network.

Triac Output

Control Mode : "Normal" or Valve Positioner

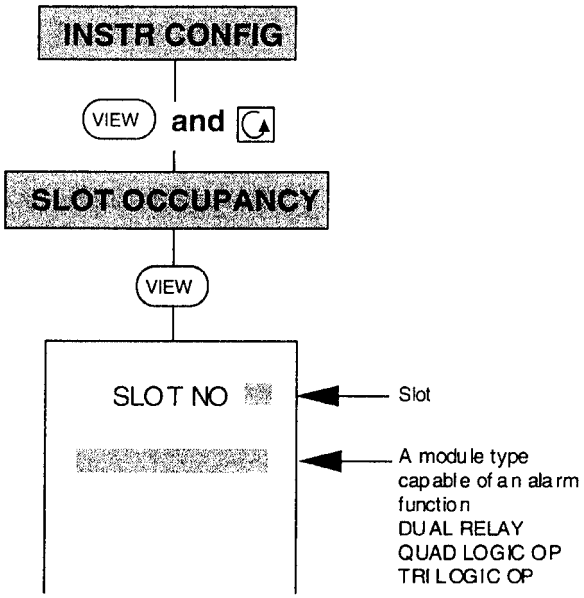
You may select the control mode by positionning the jumper LK3 on the triac module. See the diagram below.



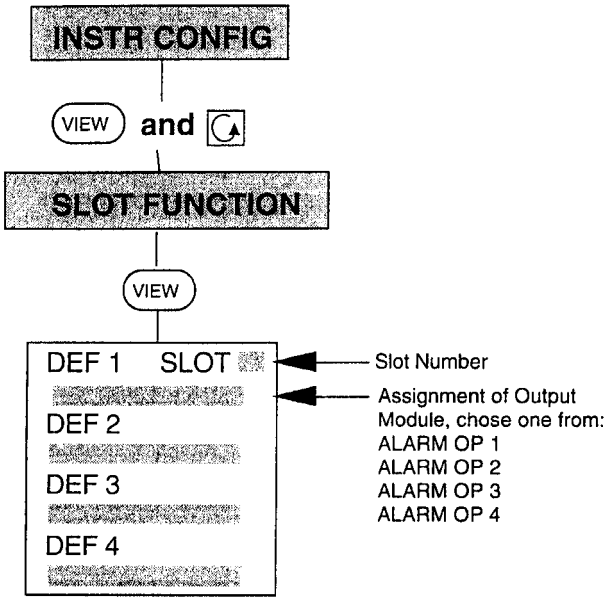
Alarms

Assigning a relay or logic module to an alarm function

* Firstly, check that a suitable module is installed in the instrument: you may use a relay or a logic output module.

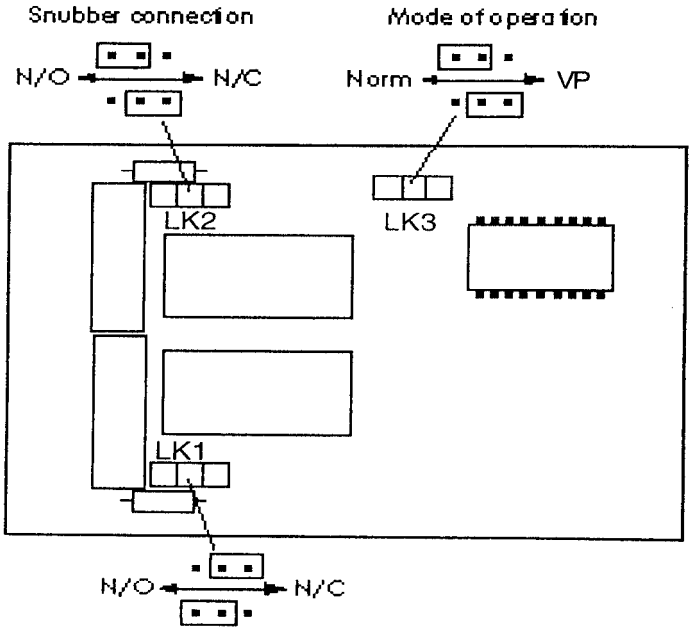


* You next need to assign these modules to an alarm function.



Protection of Alarm Relay Contacts

If the relay is to switch an inductive load (mechanic conductor or coil), it is essential to provide an RC network on the contact of the output relay (*). An RC Circuit (R = 100 Ω, C = 22nF) is provided on relay modules. It may be connected to the normally open (N/O) or the normally closed (N/C) contact: the choice is made using the links LK1 (relay 1) and LK2 (relay 2).



(*) : The RC Network draws 1mA at 120V AC and 2mA at 240V AC, which is sufficient to energise the coil of certain high impedance relays: in such cases, you must not connect the RC network.

Alarm Type

For each alarm assigned in this way, you will need to set an alarm type (see diagram below). These can be one of the following:

- Full Scale High - FS HIGH - Note 1
- Full Scale Low : FS LOW - Note 1
- Deviation High : DEV HIGH - Note 2
- Deviation Low : DEV LOW - Note 2
- Rate of Change : RATE CHG
- Sensor Break : SNSR BRK
- Loop Break: LP BRK
- Deviation Band : DEV BAND

Note 1 : A full scale alarm is an alarm for which the threshold is independant of the control setpoint and can be set to any value in the range of the measured value:

- If the alarm relay is to trigger **above** the threshold, the alarm is a full scale high alarm.
- If the alarm relay is to trigger **below** the threshold, the alarm is a full scale low alarm.

Note 2 : A Deviation alarm is an alarm for which the threshold represents a deviation from the control setpoint. If this threshold is situated:

- **Above** the setpoint, the alarm is a deviation high alarm.
- **Below** the setpoint, the alarm is a deviation low alarm.
- **Centered** around the setpoint, the alarm is a band alarm.

Assigning an Alarm to a Variable

The alarm can be assigned to:

- The measured value 1 (PV1) or 2 (PV 2)
- The Output Power 1 (OP1) or 2 (OP2)
- Linearised Value 1 (LV1) or 2 (LV2)
- Remote Setpoint 1 (RV1) or 2 (RV2)
- Valve Positionner Value 1 (VP1) or 2 (VP2)
- Calculated Values 1 to 8 (CV1 - CV8)

Alarm Latching

The alarm may be set to be latching or non-latching (see diagram below)

* When an alarm is set to latch, the output leaves the alarm state only when the alarm condition is no longer present and the alarm has been acknowledged.
* For non-latching alarms, the output leaves the alarm state as soon as the alarm condition is no longer present.

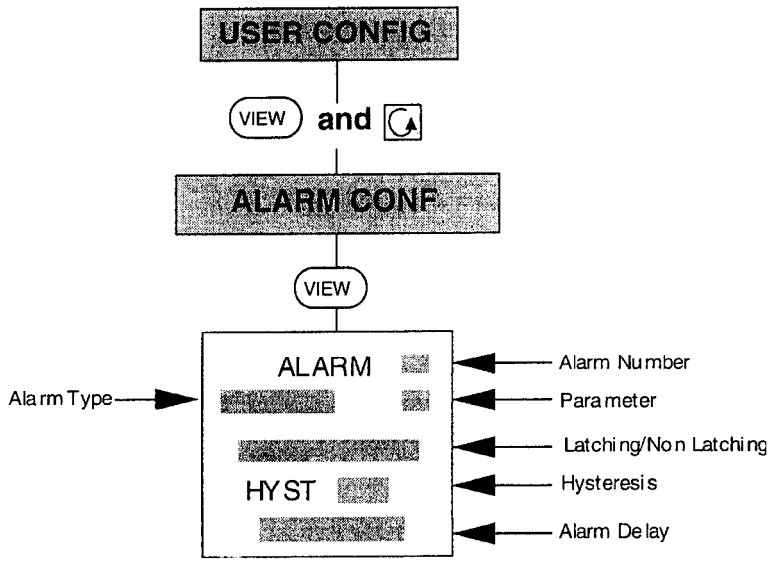
Alarm Hysteresis

This is a gap between the alarm threshold and the point at which the alarm relay triggers or is released.

The value is expressed as a percentage of the span of the parameter assigned to the alarm and may be set between 0.1 and 50.0%.

Alarm Delay

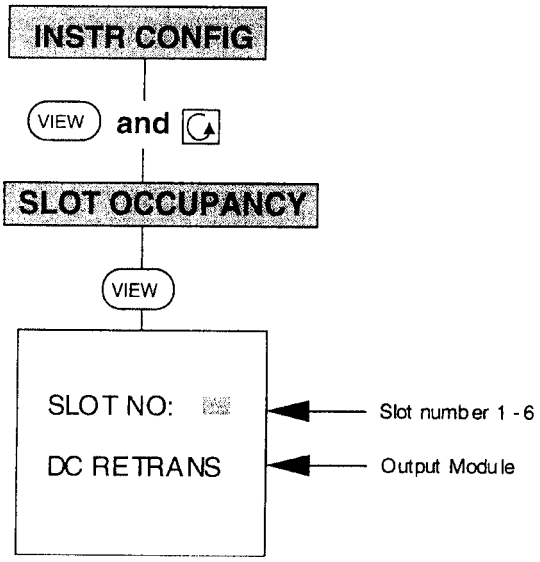
It is possible to impose a delay before the triggering of an alarm, in order to avoid spurious alarms when glitches occur. Access to the alarm delay function is enabled using the ALARM CONF sub-menu of the USER CONFIG menu: the actual delay time is entered in Operator Mode.



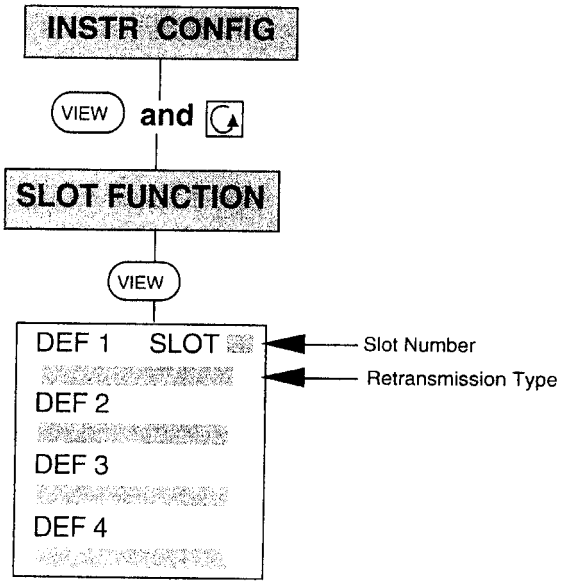
Retransmission Output

Presence of Retransmission Module

This should be checked using the SLOT OCCUPANCY sub-menu.



Retransmission Type

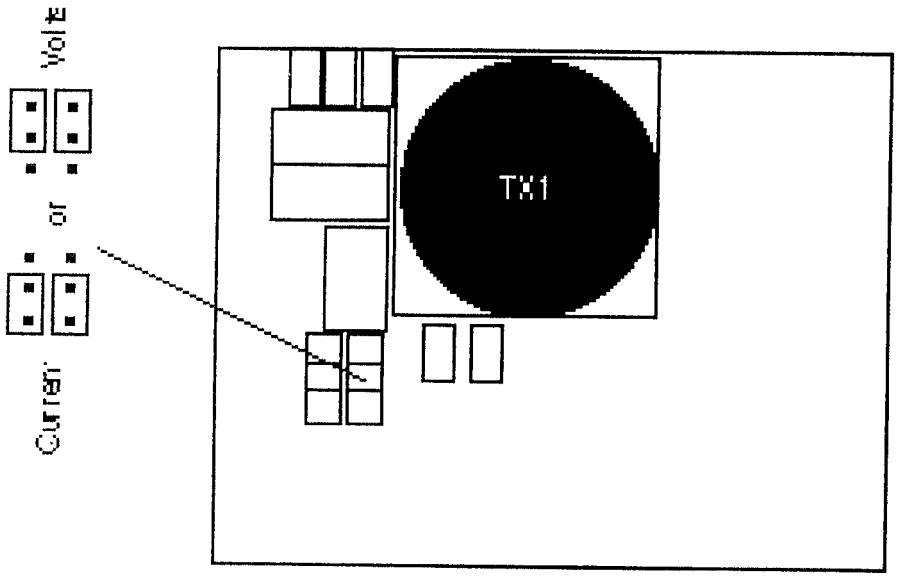


The following settings are possible :
- LOOP 1 ERROR: Error (Measured Value - Setpoint) of Loop 1
- LOOP 1 OP: Output Power of Loop 1

- LOOP 1 PV: Measured Value of Loop 1
- LOOP 1 SP: Loop 1 Setpoint
- LOOP 1 IP: Loop 1 Input Value
- LOOP 2 ERROR: Error (Measured Value - Setpoint) of Loop 2
- LOOP 2 OP: Output Power of Loop 2
- LOOP 2 PV: Measured Value of Loop 2
- LOOP 2 SP: Loop 2 Setpoint
- LOOP 2 IP: Loop 2 Input Value

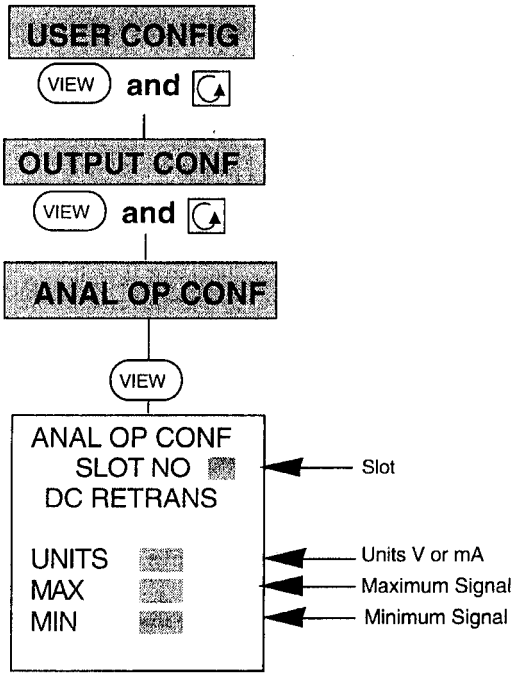
Selection of Voltage or Current

You may select a voltage or a current signal using 2 jumpers on the DC output module itself.



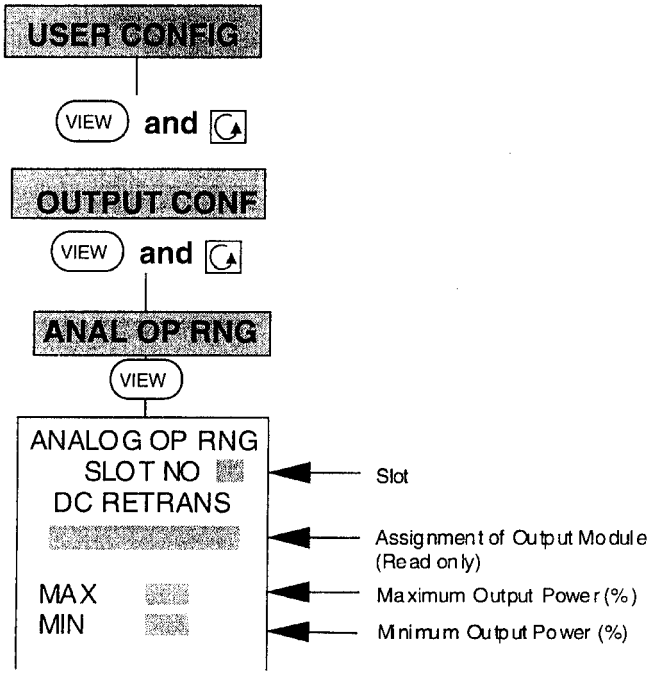
Units and Scaling

The units and the maximum and minimum values for the output signal must now be defined. For current signals, the maximum is limited to 20mA. For voltage signals, the maximum is limited to 10V.



Range of the Transmitted Value

You can limit the amplitude of the transmitted signal using the ANAL O/P RANGE menu:



Example :

Assume the controller is set up with a range of 0 to 1000 °C: to perform a retransmission of the measured value in the range of 600 - 800 °C, set the values of MIN = 600 and MAX = 800.

Digital Communications

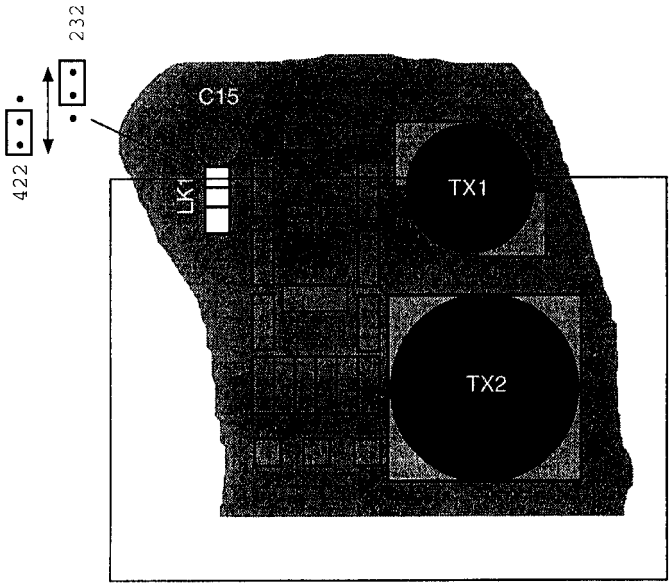
"**Slave**" digital communications is available as standard in all 900 EPC series controllers. It is also possible to use "**Master**" communications as an option that allows the 900 EPC to send data and setpoints to other equipment or controllers.

Slave Communications

Transmission Standards

The options for the transmission standard, which may be:
- RS 232 (One controller only on the communications line)
- RS 422 (Several controllers: up to 32 on the same line)

is made using a jumper on the Power Supply/Digital Comms board within the instrument.



Protocol

Three communications protocols are available: EI Bisynch, MODBUS® et JBUS®. You may choose between these using the DIGITAL COMMS sub-menu from the USER CONFIG sub-menu. See the diagram below.

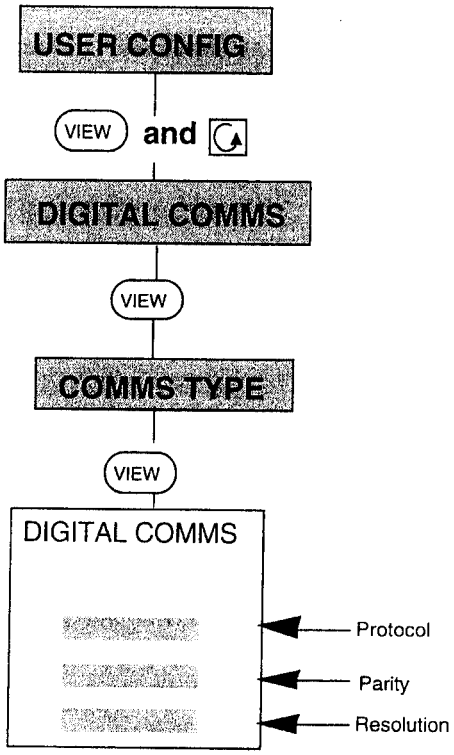
Parity

For the MODBUS® and JBUS® protocols, you need to set the parity used by the instrument, either EVEN, ODD,or NONE. You may choose between these using the DIGITAL COMMS sub-menu from the USER CONFIG sub-menu. See the diagram below.

Resolution

For the MODBUS® and JBUS® protocols, you need to set the resolution used for the representation of numeric data:
- FULL RES : full resolution (integer and decimal parts)
- INTEGER RES : integer part only

You may choose between these using the DIGITAL COMMS sub-menu from the USER CONFIG sub-menu. See the diagram below.



Baud Rate and Comms Address

The number used for comms address and the baud rate of communications are set in level 3, operator mode (see chapter 2).

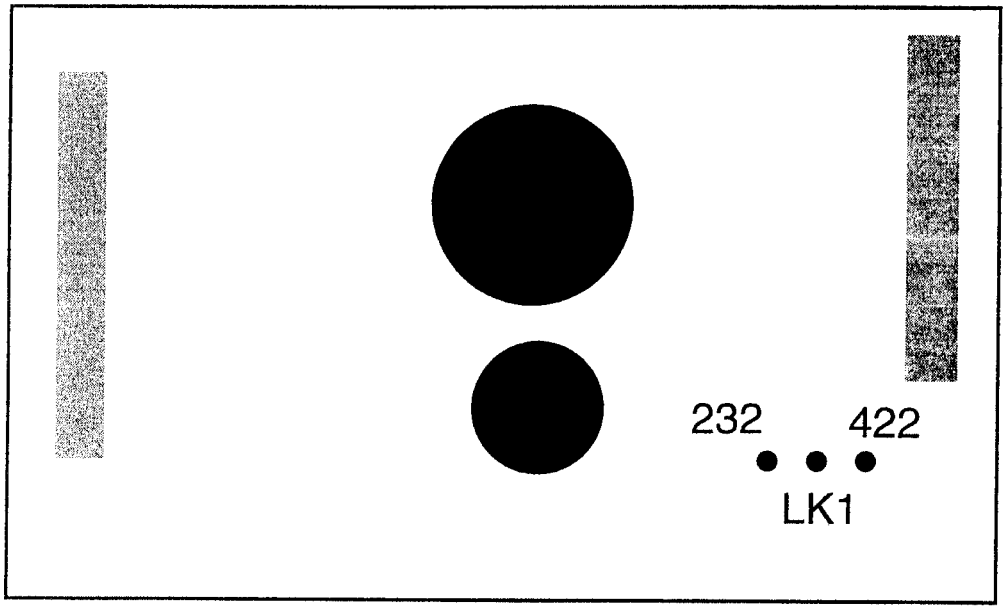
Master Communications

For more information, please refer to the special functions manual.

Transmission Standards

The choice of transmission standard, which may be either :
- RS 232 (a single controller on the communication line)
- RS 422 (several controllers: up to 32 on the same line)

is made using the link LK1 on the Master Communications module which must always be fitted in slot 6 of the option card.



Protocol

Follow the same procedure as used for slave comms (see this chapter 5)

Parity

Follow the same procedure as used for slave comms (see this chapter 5)

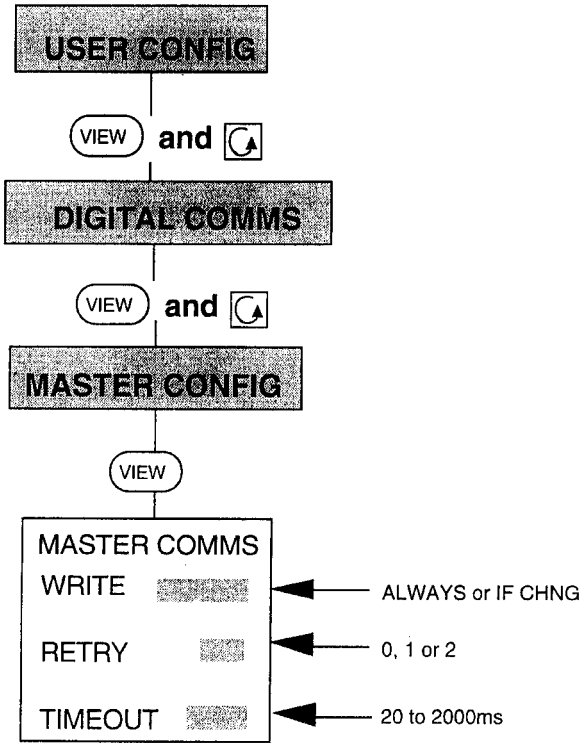
Resolution

Follow the same procedure as used for slave comms (see this chapter 5)

Write Mode

The write mode defines:
- The conditions under which the value is sent
ALWAYS : The parameter is transmitted every second
IF CHNG: The parameter is transmitted whenever it changes value.
- The number of times an attempt is made to send a message before giving up in case of transmission errors: this number (RETRY) may be set to 0, 1 or 2.
- The maximum time to wait for an acknowledgement after a write (TIMEOUT), may be set between 20 and 2000 ms

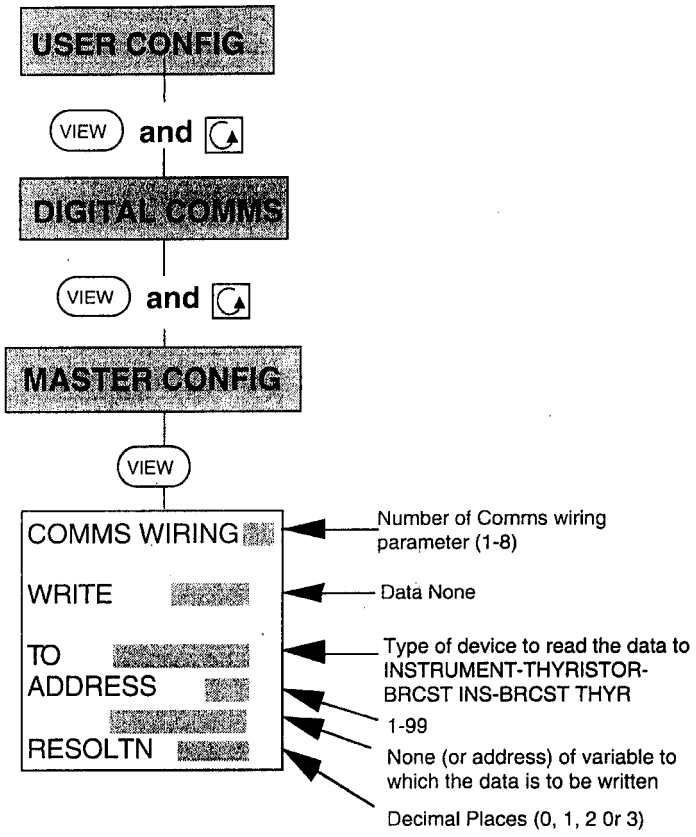
To set up these options, use the following procedure:



Defining Communications Wiring

Up to 8 communications transactions may be defined, each one corresponding to a write of one parameter. The communications wiring configuration is used to set up the 900 EPC parameter (WRITE) that is to be sent, the type of device it is to be sent to (TO), the address of the device (ADDRESS), the address or mnenomic to which the data is to be sent, and the number of decimal places to be used (RESOLTN).

To set this up, follow this procedure:

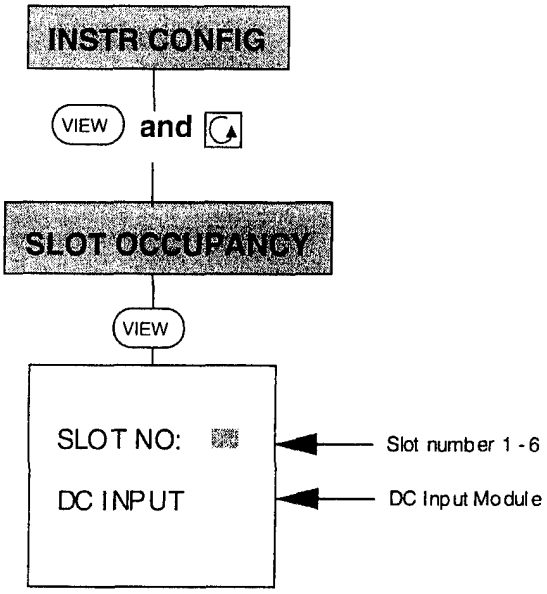


Third Process Input

A third process input allows a two loop controller to use a ratio loop.

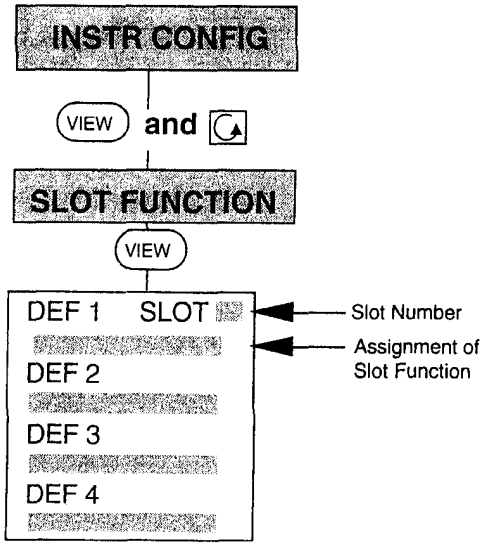
Checking for the Presence of a DC Input Module

This may be verified from the SLOT OCCUPANCY sub-menu.



Assigning the DC Input Module

The assignment of the DC input module to the third process input is performed using the SLOT FUNCTION sub-menu.



Valve Positioner Feedback Potentiometer

When using valve position control, it is possible to use a feedback potentiometer to determine the position of the valve. This requires a DC Input module.

Checking for the presence of a DC Input Module

This may be verified from the SLOT OCCUPANCY sub-menu

Assigning the DC Input Module

See the SLOT OCCUPANCY sub-menu; Choose with Δ or ∇ :

- VP POS LP1 : Feedback Potentiometer on Loop 1
- VP POS LP2 : Feedback Potentiometer on Loop 2

Telemetry Input

A telemetry input is an external analogue input which is treated by the 900 EPC as anumeric parameter. To use such an input, you require a DC Input module.

Checking for the presence of a DC Input Module

See the SLOT OCCUPANCY sub-menu; Choose with Δ or ∇ :

Assigning the DC Input Module

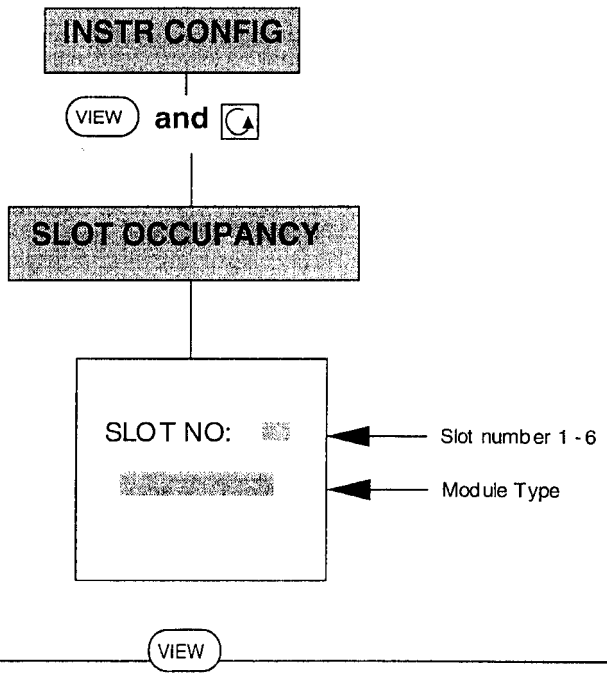
See the SLOT OCCUPANCY sub-menu; Choose with Δ or ∇ : TLMTRY ANA IP

Digital Inputs

The digital inputs allow you to select a large number of 900 EPC functions.

Checking for the presence of a Digital Input Module

This may be checked using the SLOT OCCUPANCY sub-menu: you need a module of the type: QUAD LOGIC IP



Assigning Digital Inputs to Functions

For details of the procedure to follow, see "Assignment of the DC Input" in this chapter. Make your choise with Δ or ∇ (See following table). When the function has been configured and is activated by a digital input, it may not be disactivated using the keypad or by means of digital communications. However, when the function is not active, it may be activated by the keypad or digital comms.

FUNCTION	STATE	
NONE	No Function	
AUTO MAN LP1	Manual (2)	Auto (4)
REM ENABL LP1	Active (2)	Off (4)
SP2 ENABL LP1	Active (2)	Off (4)
SP RATLIM LP1	Active (2)	Off (4)
FRZ INTEG LP1	Active (2)	Off (4)
OP RATLIM LP1	Active (2)	Off (4)
AUTO TUNE LP1	Active (2)	Off (4)
ADAP TUNE LP1	Active (2)	Off (4)
GAIN SCHE LP1	Active (2)	Off (4)
RATIO ENABLE	Active (2)	Off (4)
RAT SP2 ENAB	Active (2)	Off (4)
CASCDE ENABLE	Active (2)	Off (4)
AUTO MAN LP2	Manual (2)	Auto (4)
REM ENABL LP2	Active (2)	Off (4)
SP2 ENABL LP2	Active (2)	Off (4)
SP RATLIM LP2	Active (2)	Off (4)
FRZ INTEG LP2	Active (2)	Off (4)
OP RATLIM LP2	Active (2)	Off (4)
AUTO TUNE LP2	Active (2)	Off (4)
ADAP TUNE LP2	Active (2)	Off (4)
GAIN SCHE LP2	Active (2)	Off (4)
AUTO MAN 1&2	Manual (2)	Auto (4)
REM ENABL 1&2	Active (2)	Off (4)
SP2 ENABL 1&2	Active (2)	Off (4)
SP RATLIM 1&2	Active (2)	Off (4)
FRZ INTEG 1&2	Active (2)	Off (4)
OP RATLIM 1&2	Active (2)	Off (4)
AUTO TUNE 1&2	Active (2)	Off (4)
ADAP TUNE 1&2	Active (2)	Off (4)
GAIN SCHE 1&2	Active (2)	Off (4)
CASCADE TUNE	Active (2)	Off (4)
KEYLOCK ENABL	Keys Disabled (2)	Enabled (4)
SELECT IP 2	IP1 (1)	IP2 (2)
DIG COMMS DIS	Disabled (2)	Enabled (1)
DIG RETRA DIS	Disabled (2)	Enabled (1)
BROADCAST DIS	Disabled (2)	Enabled (1)
STANDBY ENABL	Standby Enabled (2)	Standby Disabled (1)
TIMER DISABL	Disabled (2)	Enabled (1)
TIMER 1 ON	Disabled (2)	Enabled (1)
TIMER 2 ON	Disabled (2)	Enabled (1)
TIMER 3 ON	Disabled (2)	Enabled (1)
TIMER 4 ON	Disabled (2)	Enabled (1)
SP1 LOOP1	Active (2)	Off (4)

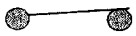
FUNCTION	STATE	
SP1 LPS 1&2	Active (2)	Off (4)
RST ALARM 1-4	Active (2)	Off (4)
RST ALARM 5-8	Active (2)	Off (4)
RST DELAY ALM	Active (2)	Off (4)
ACK ALARM 1-4	Active (2)	Off (4)
ACK ALARM 5-8	Active (2)	Off (4)
ALARM ACK	Active (2)	Off (4
TELEMETRY	Disabled (2)	Enabled (1)
RESET TLSR 1	Active (2)	Off (4)
RESET TLSR 2	Active (2)	Off (4)
RESET TLSR 3	Active (2)	Off (4)
RESET TLSR 4	Active (2)	Off (4)
RST ALL TLSR	Active (2)	Off (4)
HOLD TLSR 1	Disabled (2)	Enabled (1)
HOLD TLSR 2	Disabled (2)	Enabled (1)
HOLD TLSR 3	Disabled (2)	Enabled (1)
HOLD TLSR 4	Disabled (2)	Enabled (1)
HOLD ALL TLSR	Disabled (2)	Enabled (1)
RUN	Run (2)	
RESET	Reset (2)	
HOLD	Hold (2)	
RUN HOLD	Run (2)	Hold (4)
RUN RESET	Run (2)	Reset (4)
HOLD RUN	Hold (2)	Run (4)
HOLDBACK DIS	Disabled (2)	Enabled (1)
LP1 SKIP SEG	Skip Segment (2)	
LP2 SKIP SEG	Skip Segment (2)	
1&2 SKIP SEG	Skip Segment (2)	
LP1 WAIT UNTL	Wait (2)	No Wait (1)
LP2 WAIT UNTL	Wait (2)	No Wait (1)
1&2 WAIT UNTL	Wait (2)	No Wait (1)
LOAD PROG LP1	Load (4)	
LOAD PROG LP2	Load (4)	
LOAD PROG 1&2	Load (4)	
LP1 LSD PRGNO	Read 0 (1)	Read 1 (2)
LP1 2LSD PGNO	Read 0 (1)	Read 1 (2)
LP1 3LSD PGNO	Read 0 (1)	Read 1 (2)
LP1 MSD PRGNO	Read 0 (1)	Read 1 (2)
LP2 LSD PRGNO	Read 0 (1)	Read 1 (2)
LP2 2LSD PGNO	Read 0 (1)	Read 1 (2)
LP2 3LSD PGNO	Read 0 (1)	Read 1 (2)
LP2 MSD PRGNO	Read 0 (1)	Read 1 (2)
1&2 LSD PRGNO	Read 0 (1)	Read 1 (2)
1&2 2LSD PRGN	Read 0 (1)	Read 1 (2)
1&2 3LSD PRGN	Read 0 (1)	Read 1 (2)
1&2 MSD PRGNO	Read 0 (1)	Read 1 (2)
LP1 BCD1 PGNO	Read 0 (1)	Read 1 (2)
LP1 BCD2 PGNO	Read 0 (1)	Read 1 (2)
LP1 BCD3 PGNO	Read 0 (1)	Read 1 (2)
LP1 BCD4 PGNO	Read 0 (1)	Read 1 (2)
LP1 BCD5 PGNO	Read 0 1)	Read 1 (2)
LP1 BCD6 PGNO	Read 0 (1)	Read 1 (2)

FUNCTION	STATE	
LP1 BCD7 PGNO	Read 0 (1)	Read 1 (2)
LP1 BCD8 PGNO	Read 0 (1)	Read 1 (2)
LP2 BCD1 PGNO	Read 0 (1)	Read 1 (2)
LP2 BCD2 PGNO	Read 0 (1)	Read 1 (2)
LP2 BCD3 PGNO	Read 0 (1)	Read 1 (2)
LP2 BCD4 PGNO	Read 0 (1)	Read 1 (2)
LP2 BCD5 PGNO	Read 0 (1)	Read 1 (2)
LP2 BCD6 PGNO	Read 0 (1)	Read 1 (2
LP2 BCD7 PGNO	Read 0 (1)	Read 1 (2)
LP2 BCD8 PGNO	Read 0 (1)	Read 1 2)
BTH BCD1 PGNO	Read 0 (1)	Read 1 (2
BTH BCD2 PGNO	Read 0 (1)	Read 1 (2)
BTH BCD3 PGNO	Read 0 (1)	Read 1 (2)
BTH BCD4 PGNO	Read 0 (1)	Read 1 (2)
BTH BCD5 PGNO	Read 0 (1)	Read 1 (2)
BTH BCD6 PGNO	Read 0 (1)	Read 1 (2)
BTH BCD7 PGNO	Read 0 (1)	Read 1 (2)
BTH BCD8 PGNO	Read 0 (1)	Read 1 (2)
LP1 LSD SCHD	Read 0 (1)	Read 1 (2
LP1 2LSD SCHD	Read 0 (1)	Read 1 (2)
LP1 MSD SCHD	Read 0 (1)	Read 1 (2)
LP2 LSD SCHD	Read 0 (1)	Read 1 2)
LP2 2LSD SCHD	Read 0 (1)	Read 1 2)
LP2 MSD SCHD	Read 0 (1)	Read 1 2)
1&2 LSD SCHD	Read 0 (1)	Read 1 (2)
1&2 2LSD SCHD	Read 0 (1)	Read 1 (2)
1&2 MSD SCHD	Read 0 (1)	Read 1 (2)
ADAP FILL LP1	Disabled (2)	Enabled (1)
ADAP FILL LP2	Disabled (2)	Enabled (1)
CLEAN PROBE	Active (2)	Off (4)
RAISE KEY	Increment (2)	
LOWER KEY	Decrement (2)	

Digital inputs may be either level or edge triggered:

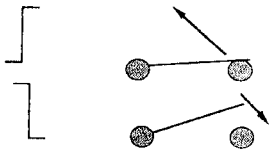
Level

(1) High: 2 - 5V or open circuit 

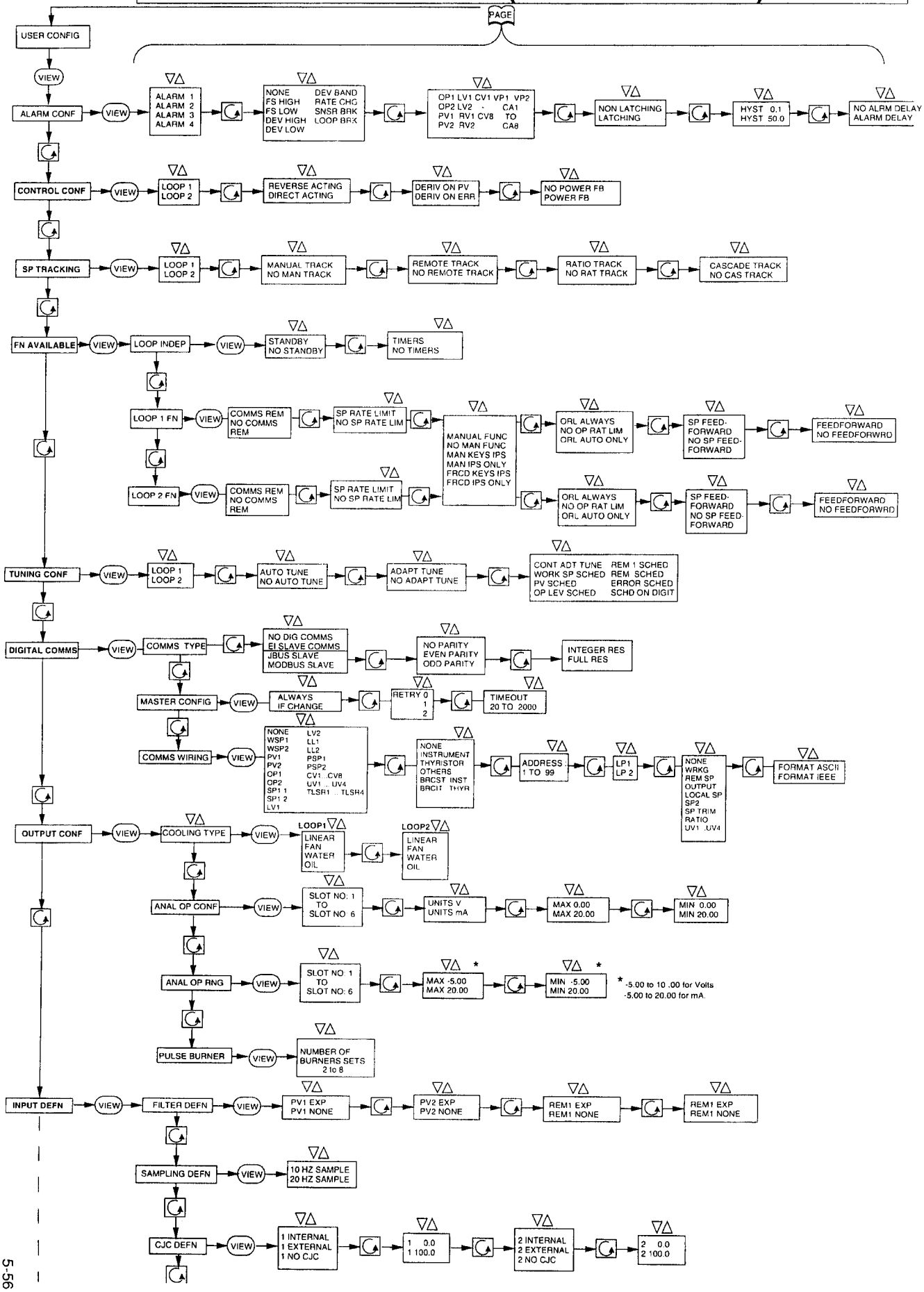
(2) Low : 0 - 2V or short circuit 

Edge

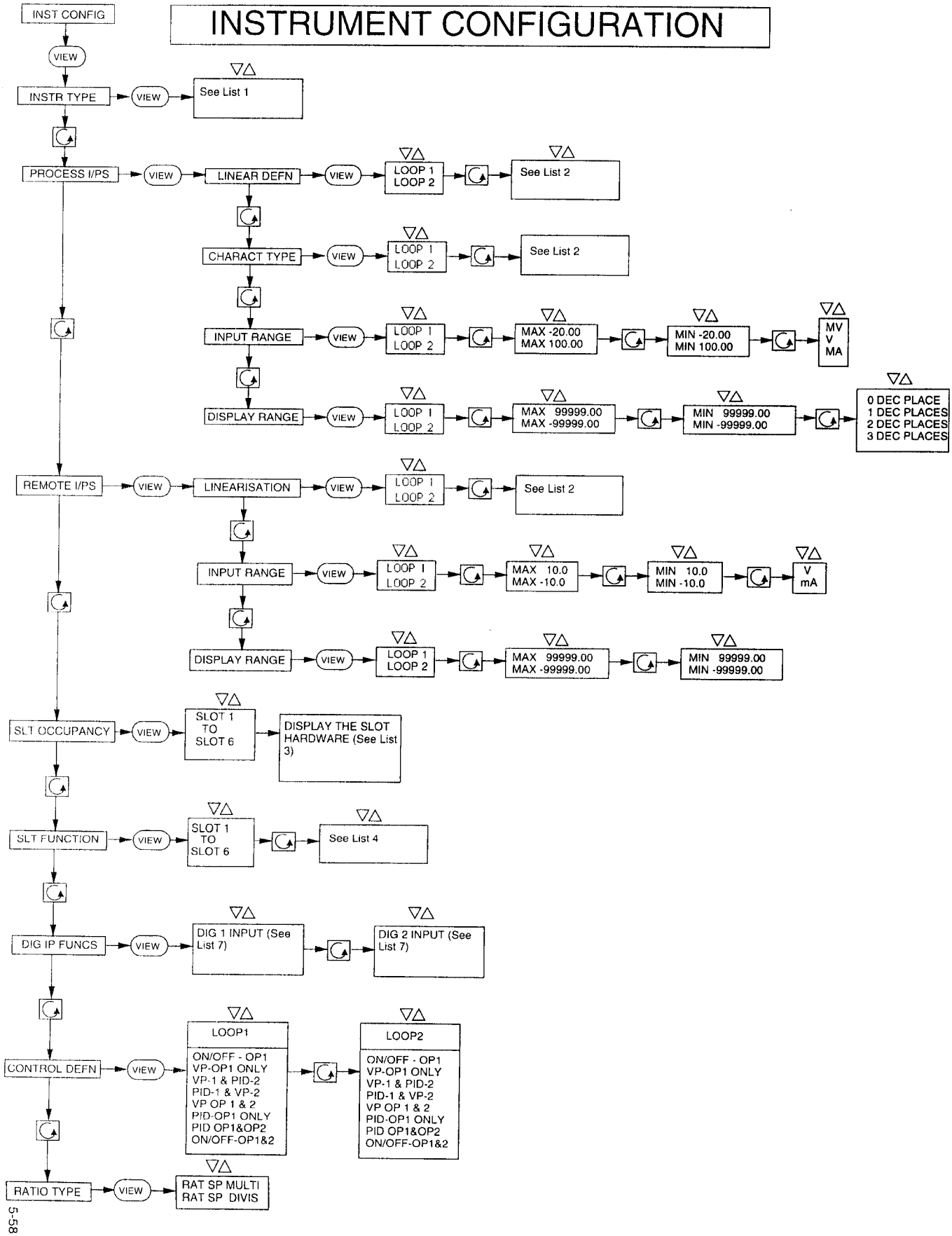
(3) Rising

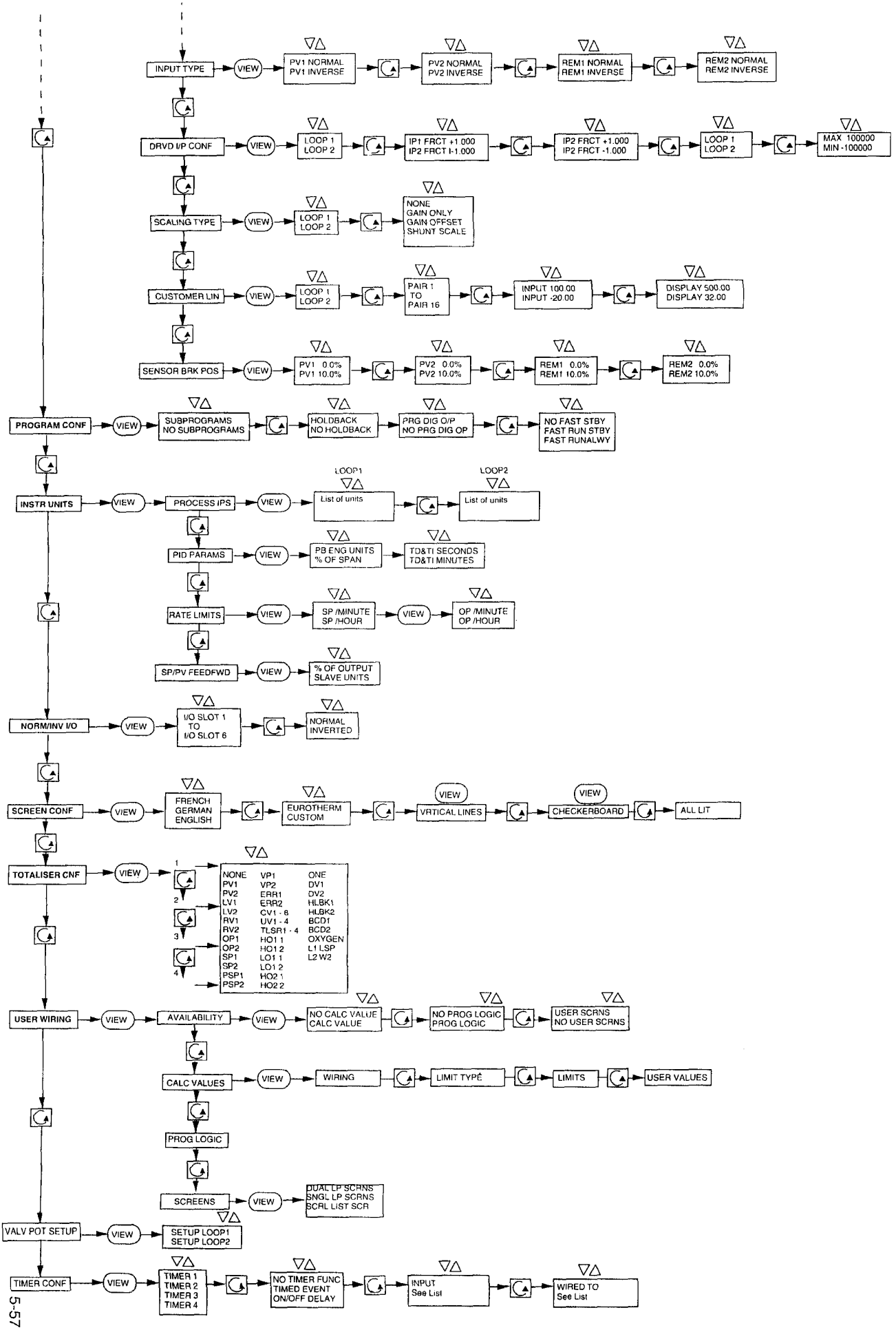
(4) Falling 

USER CONFIGURATION ("USER CONFIG")



INSTRUMENT CONFIGURATION




INPUT TYPE
VIEW
PV1 NORMAL
PV1 INVERSE
PV2 NORMAL
PV2 INVERSE
REM1 NORMAL
REM1 INVERSE
REM2 NORMAL
REM2 INVERSE
DRVD I/P CONF
VIEW
LOOP 1
LOOP 2
IP1 FRCT +1.000
IP2 FRCT I-1.000
IP2 FRCT +1.000
IP2 FRCT -1.000
LOOP 1
LOOP 2
MAX 100000
MIN -100000
SCALING TYPE
VIEW
LOOP 1
LOOP 2
NONE
GAIN ONLY
GAIN OFFSET
SHUNT SCALE
CUSTOMER LIN
VIEW
LOOP 1
LOOP 2
PAIR 1
TO
PAIR 16
INPUT 100.00
INPUT -20.00
DISPLAY 500.00
DISPLAY 32.00
SENSOR BRK POS
VIEW
PV1 0.0%
PV1 10.0%
PV2 0.0%
PV2 10.0%
REM1 0.0%
REM1 10.0%
REM2 0.0%
REM2 10.0%
PROGRAM CONF
VIEW
SUBPROGRAMS
NO SUBPROGRAMS
HOLDBACK
NO HOLDBACK
PRG DIG O/P
NO PRG DIG OP
NO FAST STBY
FAST RUN STBY
FAST RUNALWY
INSTR UNITS
VIEW
PROCESS IPS
VIEW
LOOP1
List of units
LOOP2
List of units
PID PARAMS
VIEW
PB ENG UNITS
% OF SPAN
TD&TI SECONDS
TD&TI MINUTES
RATE LIMITS
VIEW
SP /MINUTE
SP /HOUR
VIEW
OP /MINUTE
OP /HOUR
SP/PV FEEDFWD
VIEW
% OF OUTPUT
SLAVE UNITS
NORM/INV I/O
VIEW
I/O SLOT 1
TO
I/O SLOT 6
NORMAL
INVERTED
SCREEN CONF
VIEW
FRENCH
GERMAN
ENGLISH
EUROTHERM
CUSTOM
VIEW
VRTICAL LINES
VIEW
CHECKERBOARD
ALL LIT
TOTALISER CNF
VIEW
1
2
3
4
NONE VP1 ONE
PV1 VP2 DV1
PV2 ERR1 DV2
LV1 ERR2 HLBK1
LV2 CV1 - 8 HLBK2
RV1 UV1 - 4 BCD1
RV2 TLSR1 - 4 BCD2
OP1 HO1 1 OXYGEN
OP2 HO1 2 L1 LSP
SP1 LO1 1 L2 W2
SP2 LO1 2
PSP1 HO2 1
PSP2 HO2 2
USER WIRING
VIEW
AVAILABILITY
VIEW
NO CALC VALUE
CALC VALUE
NO PROG LOGIC
PROG LOGIC
USER SCRNS
NO USER SCRNS
CALC VALUES
VIEW
WIRING
LIMIT TYPE
LIMITS
USER VALUES
PROG LOGIC
SCREENS
VIEW
DUAL LP SCRNS
SNGL LP SCRNS
SCRL LIST SCR
VALV POT SETUP
VIEW
SETUP LOOP1
SETUP LOOP2
TIMER CONF
VIEW
TIMER 1
TIMER 2
TIMER 3
TIMER 4
NO TIMER FUNC
TIMED EVENT
ON/OFF DELAY
INPUT
See List
WIRED TO
See List

List 1 Instrument Type

CASCADE CONT ..... Cascade controller
CASCADE PROG ..... Cascade programmer
DERVD DUAL LP ..... Dual loop derived input controller
DERVD DUAL PG ..... Dual loop derived input programmer
DERVD SING LP ..... Single loop derived input controller
DERVD SING PG ..... Single loop derived input programmer
DUAL LP CONT ..... Dual loop controller
DUAL LP GRAVI ..... Dual loop gravimetric programmer
DUAL LP PROG ..... Dual Loop programmer
HUMIDITY CONT ..... Humidity Controller
HUMIDITY PROG ..... Humidity Programmer
MAX IP CON ..... Controller using the maximum of two inputs
MAX IP PRG ..... Programmer using the maximum of two inputs
MIN IP CON ..... Controller using the minimum of two inputs
MIN IP PRG ..... Programmer using the minimum of two inputs
RAT&INDP CONT ..... Ratio controller with second independant loop
RAT&INDP PROG ..... Ratio programmer with second independant loop
RAT&NORM CONT ..... Ratio controller with 2 PID outputs
RAT&NORM PROG ..... Ratio programmer with 2 pid outputs
RATIO CONT ..... Ratio controller
SELECT IP CON ..... Controller with input selectable by digital input
SELECT IP PRG ..... Programmer with input selectable by digital input
SING LP CONT ..... Single loop controller
SING LP GRAVI ..... Single loop gravimetric controller
SING LP PROG ..... Single loop gravimetric programmer
SWTCHOVER CON ..... Switchover Controller
SWTCHOVER PRG ..... Switchover Programmer
TEM&HUM CONT ..... Temperature and Humidity controller
TEM&HUM PROG ..... Temperature and Humidity Programmer
ZIR CONT ..... Zirconia Probe controller (Carbon potential)
ZIR PROG ..... Zirconia Probe programmer (Carbon Potential)
ZIR&INDP CONT ..... Zirconia Probe controller with second independant loop
ZIR&INDP PROG ..... Zirconia Probe programmer with second independant loop

List 2
Linearisation and Sensor Type

B T/C ..... Type B Thermocouple
C T/C ..... Type C Thermocouple
CHARACTERISED ..... Signal using linearisation of another sensor in this list
CUSTOM CJC ..... Custom linearisation, CRC
CUSTOM EMISS ..... Custom Emissivity
CUSTOM ONLY ..... Custom linearisation, no CJC
DT1-PYRO ..... DT1 Pyrometer
E T/C ..... Type E Thermocouple
FP/GP-10-PYRO ..... FP/GP 10 Pyrometer
FP/GP-11-PYRO ..... FP/GP 11 Pyrometer
FP/GP-12-PYRO ..... FP/GP 12 Pyrometer
FP/GP-20-PYRO ..... FP/GP 20 Pyrometer
FP/GP-21-PYRO ..... FP/GP 21 Pyrometer
G2-W/WRE26%TC ..... Thermocouple W/W26%Re
IVDI-PYRO ..... IVDI Pyrometer
J T/C ..... Type J Thermocouple
JIS-100 ..... JIS Resistance Thermometer (100 ohms)
K T/C ..... Type K Thermocouple
L T/C ..... Type L Thermocouple
LINEAR ..... Linear
MOLY5%RE/41% ..... Thermocouple 5%/Re41% Molybdene
N-NILSIL/TC ..... Type N Nicrosil/Nisil Thermocouple
NI/NI18%MOLY ..... Thermocouple Ni/Ni18% Molybdene
P10/40-RHS/TC ..... Thermocouple Pt10%Rh/Pt40%Rh
PLATINELL/TC ..... Platinel Thermocouple
Q003-PYRO ..... Q003 Pyrometer (Land)
Q004-PYRO ..... Q004 Pyrometer (Land)
R T/C ..... Type R Thermocouple
R20/40-RH/TC ..... Thermocouple Pt20%Rh/Pt40%Rh
RO23-PYRO ..... RO23 Pyrometer
RO26-ORK-35-2 ..... R026 Pyrometer
RT100 ..... 100 ohm resistance Thermometer
S T/C ..... Type S Thermocouple
SQUARE/ROOT ..... Square root
T T/C ..... Type T Thermocouple
W/W-26 T/C ..... Thermocouple W:W26Re
W3W-25-HER/TC ..... Thermocouple W3%W25%
W5W-26 T/C ..... Thermocouple W5%W/Re26
W5W-26-BIC/TC ..... Thermocouple W5%%W25%

List 3 Slot Occupancy

COMMS ..... Master comms module
DC CONTRL ..... DC Control Output
DC INPUT ..... Remote Input
DC RETRANS ..... Analogue Retransmission (DC Output)
DUAL REL OME ..... Dual Relay (exclusive)
DUAL RELAY ..... Dual Relay
DUAL TR OME ..... Dual Triac Output (exclusive)
DUAL TRIAC ..... Dual Traic Output
EMPTY ..... Empty
QUAD LOGIC IP ..... Quad Logic Input
QUAD LOGIC OP ..... Quad Logic Output
SING LOGIC ..... Single Logic Output
SING RELAY ..... Single Relay
SING TRIAC ..... Single Triac Output
TRI LOGIC OP ..... Triple Logic Output
VP POT POS IP ..... Valve Positioner feedback pot

List 4 Slot Function

Digital Inputs

1&2 2LSD PRGN ..... Bit 1 of program number for loop 1 & 2
1&2 2LSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 1
1&2 3LSD PRGN ..... Bit 2 of program number for loop 1 & 2
1&2 LSD PRGNO ..... Bit 0 of program number for loop 1 & 2
1&2 LSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 0
1&2 MSD PRGNO ..... Bit 3 of program number for loop 1 & 2
1&2 MSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 2
1&2 SKIP SEG ..... Skip Segment, Loop 1 & 2
1&2 WAIT UNTL ..... Wait until, loop 1 & 2
ACK ALARM 1-4 ..... Acknowledge alarms 1 to 4
ACK ALARM 5-8 ..... Acknowledge alarms 5 to 8
ADAP FILL LP1 ..... Select Fill Algorithm, Loop 1
ADAP FILL LP2 ..... Select Fill Algorithm, Loop 2
ADAP TUNE 1&2 ..... Select Adaptive Tune, Loop 1 & 2
ADAP TUNE LP1 ..... Select Adaptive Tune, Loop 1
ADAP TUNE LP2 ..... Select Adaptive Tune, Loop 2
ALARM ACK ..... Acknowledge all alarms
AUTO MAN 1&2 ..... Auto Manual Select, Loop 1 & 2
AUTO MAN LP1 ..... Auto Manual Select, Loop 1
AUTO MAN LP2 ..... Auto Manual Select, Loop 2
AUTO TUNE 1&2 ..... Select Autotune, Loop 1 & 2

AUTO TUNE LP1 ..... Select Autotune, Loop 1
AUTO TUNE LP2 ..... Select Autotune, Loop 2
BROADCAST DIS ..... Disable Broadcast
BTH BCD1 PGNO ..... BCD Bit 0 of program number for loop 1 & 2
BTH BCD2 PGNO ..... BCD Bit 1 of program number for loop 1 & 2
BTH BCD3 PGNO ..... BCD Bit 2 of program number for loop 1 & 2
BTH BCD4 PGNO ..... BCD Bit 3 of program number for loop 1 & 2
BTH BCD5 PGNO ..... BCD Bit 4 of program number for loop 1 & 2
BTH BCD6 PGNO ..... BCD Bit 5 of program number for loop 1 & 2
BTH BCD7 PGNO ..... BCD Bit 6 of program number for loop 1 & 2
BTH BCD8 PGNO ..... BCD Bit 7 of program number for loop 1 & 2
CASCADE TUNE ..... Select Cascade Tune
CASCDE ENABLE ..... Enable Cascade Control
CLEAN PROBE ..... Clean Probe (Carbon Potential)
DIG COMMS DIS ..... Disable Digital Comms
DIG RETRA DIS ..... Disable Digital Retransmission
FRZ INTEG 1&2 ..... Freeze Integral, Loop 1 & 2
FRZ INTEG LP1 ..... Freeze Integral, Loop 1
FRZ INTEG LP2 ..... Freeze Integral, Loop 2
GAIN SCHE 1&2 ..... Select Gain Scheduling, Loop 1 & 2
GAIN SCHE LP1 ..... Select Gain Scheduling, Loop 1
GAIN SCHE LP2 ..... Select Gain Scheduling, Loop 2
HOLD ..... Hold Program
HOLD ALL TLSR ..... Hold all totalisers
HOLD RUN ..... Hold or Run Program (depending on state)
HOLD TLSR 1 ..... Hold Totaliser 1
HOLD TLSR 2 ..... Hold Totaliser 2
HOLD TLSR 3 ..... Hold Totaliser 3
HOLD TLSR 4 ..... Hold Totaliser 4
HOLDBACK DIS ..... Disable Holdback
KEYLOCK ENABL ..... Lock Keys on Front Panel
LOAD PROG 1&2 ..... Load program, loop 1 & 2
LOAD PROG LP1 ..... Load program, loop 1
LOAD PROG LP2 ..... Load program, loop 2
LOWER KEY ..... Function as 'lower' key
LP1 2LSD PGNO ..... Bit 1 of program number for loop 1
LP1 2LSD SCHD ..... Gain Scheduling set number for loop 1, bit 1
LP1 3LSD PGNO ..... Bit 2 of program number for loop 1
LP1 BCD1 PGNO ..... BCD Bit 0 of program number for loop 1
LP1 BCD2 PGNO ..... BCD Bit 1 of program number for loop 1
LP1 BCD3 PGNO ..... BCD Bit 2 of program number for loop 1
LP1 BCD4 PGNO ..... BCD Bit 3 of program number for loop 1
LP1 BCD5 PGNO ..... BCD Bit 4 of program number for loop 1
LP1 BCD6 PGNO ..... BCD Bit 5 of program number for loop 1

LP1 BCD7 PGNO ..... BCD Bit 6 of program number for loop 1
LP1 BCD8 PGNO ..... BCD Bit 7 of program number for loop 1
LP1 LSD PRGNO ..... Bit 0 of program number for loop 1
LP1 LSD SCHD ..... Gain Scheduling set number for loop 1, bit 0
LP1 MSD PRGNO ..... Bit 3 of program number for loop 1
LP1 MSD SCHD ..... Gain Scheduling set number for loop 1, bit 2
LP1 SKIP SEG ..... Skip Segment, Loop 1
LP1 WAIT UNTL ..... Wait until, loop 1
LP2 2LSD PGNO ..... Bit 1 of program number for loop 2
LP2 2LSD SCHD ..... Gain Scheduling set number for loop 2, bit 1
LP2 3LSD PGNO ..... Bit 2 of program number for loop 2
LP2 BCD1 PGNO ..... BCD Bit 0 of program number for loop 2
LP2 BCD2 PGNO ..... BCD Bit 1 of program number for loop 2
LP2 BCD3 PGNO ..... BCD Bit 2 of program number for loop 2
LP2 BCD4 PGNO ..... BCD Bit 3 of program number for loop 2
LP2 BCD5 PGNO ..... BCD Bit 4 of program number for loop 2
LP2 BCD6 PGNO ..... BCD Bit 5 of program number for loop 2
LP2 BCD7 PGNO ..... BCD Bit 6 of program number for loop 2
LP2 BCD8 PGNO ..... BCD Bit 7 of program number for loop 2
LP2 LSD PRGNO ..... Bit 0 of program number for loop 2
LP2 LSD SCHD ..... Gain Scheduling set number for loop 2, bit 0
LP2 MSD PRGNO ..... Bit 3 of program number for loop 2
LP2 MSD SCHD ..... Gain Scheduling set number for loop 2, bit 2
LP2 SKIP SEG ..... Skip Segment, Loop 2
LP2 WAIT UNTL ..... Wait until, loop 2
NONE ..... No Function
OP RATLIM 1&2 ..... Output Power Rate limit, Loop 1 & 2
OP RATLIM LP1 ..... Output Power Rate limit, Loop 1
OP RATLIM LP2 ..... Output Power Rate limit, Loop 2
RAISE KEY ..... Function as 'raise' key
RAT SP2 ENAB ..... Enable Ratio Setpoint 2
RATIO ENABLE ..... Enable Ratio Control
REM ENABL 1&2 ..... Remote Input Enable, Loop 1 & 2
REM ENABL LP1 ..... Remote Input Enable, Loop 1
REM ENABL LP2 ..... Remote Input Enable, Loop 2
RESET ..... Reset Program
RESET TLSR 1 ..... Reset Totaliser 1
RESET TLSR 2 ..... Reset Totaliser 2
RESET TLSR 3 ..... Reset Totaliser 3
RESET TLSR 4 ..... Reset Totaliser 4
RST ALARM 1-4 ..... Reset alarms 1 to 4
RST ALARM 5-8 ..... Reset alarms 5 to 8
RST ALL TLSR ..... Reset all totalisers
RST DELAY ALM ..... Reset all alarms

RUN ..... Run Program
RUN HOLD ..... Run or Hold Program (depending on state)
RUN RESET ..... Run or Reset Program (depending on state)
SELECT IP 2 ..... Select Second Input
SP RATLIM 1&2 ..... Setpoint Rate limit, Loop 1 & 2
SP RATLIM LP1 ..... Setpoint Rate limit, Loop 1
SP RATLIM LP2 ..... Setpoint Rate limit, Loop 2
SP1 LOOP1 ..... Select SP1 on loop 1
SP1 LOOP2 ..... Select SP1 on loop 2
SP1 LPS 1&2 ..... Select SP1 on loop 1 & 2
SP2 ENABL 1&2 ..... Second Setpoint Enable, Loop 1 & 2
SP2 ENABL LP1 ..... Second Setpoint Enable, Loop 1
SP2 ENABL LP2 ..... Second Setpoint Enable, Loop 2
STANDBY ENABL ..... Enable Standby Mode
TELEMETRY ..... Enable telemetry
TIMER 1 ON ..... Turn Timer 1 on
TIMER 2 ON ..... Turn Timer 2 on
TIMER 3 ON ..... Turn Timer 3 on
TIMER 4 ON ..... Turn Timer 4 on
TIMER DISABL ..... Disable Timer functions

Digital Outputs

A-M STAT LP1 ..... Auto/Manual Status, Loop 1
A-M STAT LP2 ..... Auto/Manual Status, Loop 2
ALARM 1 ..... Alarm 1 active
ALARM 2 ..... Alarm 2 active
ALARM 3 ..... Alarm 3 active
ALARM 4 ..... Alarm 4 active
ALARM 5 ..... Alarm 5 active
ALARM 6 ..... Alarm 6 active
ALARM 7 ..... Alarm 7 active
ALARM 8 ..... Alarm 8 active
ANY ALARM OP ..... Any Alarm active
ANY DFLT CL V ..... Any Default Value in use for Calculated Value
BURNER 1 ..... Pulse Burner 1 Output
BURNER 2 ..... Pulse Burner 2 Output
BURNER 3 ..... Pulse Burner 3 Output
BURNER 4 ..... Pulse Burner 4 Output
BURNER 5 ..... Pulse Burner 5 Output
BURNER 6 ..... Pulse Burner 6 Output
BURNER 7 ..... Pulse Burner 7 Output
BURNER 8 ..... Pulse Burner 8 Output
CLEAN VALVE ..... Valve Clean Status

DFLT CAL VL 1 ..... Default Value for Calculated Value 1 in use
DFLT CAL VL 2 ..... Default Value for Calculated Value 2 in use
DFLT CAL VL 3 ..... Default Value for Calculated Value 3 in use
DFLT CAL VL 4 ..... Default Value for Calculated Value 4 in use
DFLT CAL VL 5 ..... Default Value for Calculated Value 5 in use
DFLT CAL VL 6 ..... Default Value for Calculated Value 6 in use
DFLT CAL VL 7 ..... Default Value for Calculated Value 7 in use
DFLT CAL VL 8 ..... Default Value for Calculated Value 8 in use
DOSING ALM L1 ..... Dosing alarm, Loop 1
DOSING ALM L2 ..... Dosing alarm, Loop 2
EMPTY HOP LP1 ..... Hopper Empty Indicator, Loop 1
EMPTY HOP LP2 ..... Hopper Empty Indicator, Loop 2
GRAVI MFL LP1 ..... Gravimetric MFL, Loop 1
GRAVI MFL LP2 ..... Gravimetric MFL, Loop 2
GRAVI VALVE 1 ..... Gravimetric Valve 1 Status
GRAVI VALVE 2 ..... Gravimetric Valve 2 Status
HAUL OFF ALM2 ..... Haul off alarm 2
LOG HLDBK ST ..... Log Holdback indication
LOG HOLD STAT ..... Log Holdback Status indication
LP1 SHUNT CAL ..... Shunt Calibration Indication, Loop 1
LP2 SHUNT CA ..... Shunt Calibration Indication, Loop 2
MFL CAL SYNC1 ..... MFL Cal Sync 1
MFL CAL SYNC2 ..... MFL Cal Sync 2
MFL VALID LP1 ..... MFL Valid, Loop 1
MFL VALID LP2 ..... MFL Valid, Loop 2
PRG DIG OP 10 ..... Program Digital Output 10
PRG DIG OP 11 ..... Program Digital Output 11
PRG DIG OP 12 ..... Program Digital Output 12
PROBE HEALTH ..... Probe health Status (Carbon Potential)
PROG CMPLT ST ..... Program Complete Status indication
PROG DIG OP 1 ..... Program Digital Output 1
PROG DIG OP 2 ..... Program Digital Output 2
PROG DIG OP 3 ..... Program Digital Output 3
PROG DIG OP 4 ..... Program Digital Output 4
PROG DIG OP 5 ..... Program Digital Output 5
PROG DIG OP 6 ..... Program Digital Output 6
PROG DIG OP 7 ..... Program Digital Output 7
PROG DIG OP 8 ..... Program Digital Output 8
PROG DIG OP 9 ..... Program Digital Output 9
PROG HLDBK ST ..... Program in Holdback Status indication
PROG HOL STAT ..... Program Hold Status indication
PROG RES STAT ..... Program Reset Status indication
PROG RUN STAT ..... Program Run Status indication
PV1 SNSR BRK ..... Sensor break detected on PV 1

PV2 SNSR BRK ..... Sensor break detected on PV 2
REGISTER 1 ..... Register 1
REGISTER 10 ..... Register 10
REGISTER 11 ..... Register 11
REGISTER 12 ..... Register 12
REGISTER 2 ..... Register 2
REGISTER 3 ..... Register 3
REGISTER 4 ..... Register 4
REGISTER 5 ..... Register 5
REGISTER 6 ..... Register 6
REGISTER 7 ..... Register 7
REGISTER 8 ..... Register 8
REGISTER 9 ..... Register 9
REM1 SNSR BRK ..... Remote Input break detected on PV 1
REM2 SNSR BRK ..... Remote Input break detected on PV 2
SP2 STAT LP1 ..... SP2 Active Status, Loop 1
SP2 STAT LP2 ..... SP2 Active Status, Loop 2
TIMER ACT 1 ..... Timer 1 Active
TIMER ACT 2 ..... Timer 2 Active
TIMER ACT 3 ..... Timer 3 Active
TIMER ACT 4 ..... Timer 4 Active
TIMER TRG 1 ..... Timer 1 Trigger Status
TIMER TRG 2 ..... Timer 2 Trigger Status
TIMER TRG 3 ..... Timer 3 Trigger Status
TIMER TRG 4 ..... Timer 4 Trigger Status
TLSR 1 ..... Totaliser 1 Limit reached
TLSR 2 ..... Totaliser 2 Limit reached
TLSR 3 ..... Totaliser 3 Limit reached
TLSR 4 ..... Totaliser 4 Limit reached
VP1 POS BRK ..... VP Feedback Pot break on VP 1
VP2 POS BRK ..... VP Feedback Pot break on VP 2

Analogue Outputs

CALC VALUE 1 ..... Calculated Value 1
CALC VALUE 2 ..... Calculated Value 2
CALC VALUE 3 ..... Calculated Value 3
CALC VALUE 4 ..... Calculated Value 4
CALC VALUE 5 ..... Calculated Value 5
CALC VALUE 6 ..... Calculated Value 6
CALC VALUE 7 ..... Calculated Value 7
CALC VALUE 8 ..... Calculated Value 8
LOOP1 ERROR ..... Error, Loop 1
LOOP1 IP ..... Remote Input, Loop 1

LOOP1 OP ..... Output Power, Loop 1
LOOP1 PV ..... Process Measured Value, Loop 1
LOOP1 SP ..... Setpoint, Loop 1
LOOP2 ERROR ..... Error, Loop 2
LOOP2 IP ..... Remote Input, Loop 2
LOOP2 OP ..... Output Power, Loop 2
LOOP2 PV ..... Process Measured Value, Loop 2
LOOP2 SP ..... Setpoint, Loop 2
NO OP FUNCT ..... No Output Function
OP1 CONOP LP1 ..... Control Output 1, Loop 1
OP1 CONOP LP2 ..... Control Output 1, Loop 2
OP2 CONOP LP1 ..... Control Output 2, Loop 1
OP2 CONOP LP2 ..... Control Output 2, Loop 2
TLMETRY OP ..... Telemetry output

Analogue Inputs

ATM PRESSURE ..... Atmospheric Pressure Input
FEEDFWD LP1 ..... Setpoint Feedforward, Loop 1
FEEDFWD LP2 ..... Setpoint Feedforward, Loop 2
NO ANA IP FCT ..... No Function
OP1 PWRLM LP1 ..... Output Power Limit, Loop 1
OP1 PWRLM LP2 ..... Output Power Limit, Loop 2
OP1 PWRLV LP1 ..... Output Power Limit and Level, Loop 1
OP1 PWRLV LP2 ..... Output Power Limit and Level, Loop 2
OP2 PWRLM LP1 ..... Output 2 Power Limit, Loop 1
OP2 PWRLM LP2 ..... Output 2 Power Limit Loop 2
RATIO SP TRIM ..... Ratio Setpoint Trim
SP ONLY LP1 ..... Setpoint Only, Loop 1
SP ONLY LP2 ..... Setpoint Only, Loop 2
SP TRIM LP1 ..... Setpoint Trim, Loop 1
SP TRIM LP2 ..... Setpoint Trim, Loop 2
SP+LOC TRM L1 ..... Setpoint + Local Trim, Loop 1
SP+LOC TRM L2 ..... Setpoint + Local trim for Loop 2
THIRD PV IP ..... Third PV input
TLMTRY ANA IP ..... Telemetry Analogue Input
ZIR GAS CR IP ..... Zirconia Probe Carbon Input
ZIR PROBE IP ..... Zirconia Probe Input

Valve Positioner Outputs

LP1 CH1 VPFBK ..... Loop 1, Channel 1 VP Feedback
LP1 CH1 VPPOS ..... Loop 1, Channel 1 Valve position
LP1 CH2 VPFBK ..... Loop 1, Channel 2 VP Feedback
LP1 CH2 VPPOS ..... Loop 1, Channel 2 Valve position
LP2 CH1 VPFBK ..... Loop 2, Channel 1 VP Feedback
LP2 CH1 VPPOS ..... Loop 2, Channel 1 Valve position
LP2 CH2 VPFBK ..... Loop 1, Channel 2 VP Feedback
LP2 CH2 VPPOS ..... Loop 1, Channel 2 Valve position

Comms Module

MASTER COMMS ..... Master Digital communications

List 5 Microboard Digital Inputs

1&2 2LSD PRGN ..... Bit 1 of program number for loop 1 & 2
1&2 2LSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 1
1&2 3LSD PRGN ..... Bit 2 of program number for loop 1 & 2
1&2 LSD PRGNO ..... Bit 0 of program number for loop 1 & 2
1&2 LSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 0
1&2 MSD PRGNO ..... Bit 3 of program number for loop 1 & 2
1&2 MSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 2
1&2 SKIP SEG ..... Skip Segment, Loop 1 & 2
1&2 WAIT UNTL ..... Wait until, loop 1 & 2
ACK ALARM 1-4 ..... Acknowledge alarms 1 to 4
ACK ALARM 5-8 ..... Acknowledge alarms 5 to 8
ADAP FILL LP1 ..... Select Fill Algorithm, Loop 1
ADAP FILL LP2 ..... Select Fill Algorithm, Loop 2
ADAP TUNE 1&2 ..... Select Adaptive Tune, Loop 1 & 2
ADAP TUNE LP1 ..... Select Adaptive Tune, Loop 1
ADAP TUNE LP2 ..... Select Adaptive Tune, Loop 2
ALARM ACK ..... Acknowledge all alarms
AUTO MAN 1&2 ..... Auto Manual Select, Loop 1 & 2
AUTO MAN LP1 ..... Auto Manual Select, Loop 1
AUTO MAN LP2 ..... Auto Manual Select, Loop 2
AUTO TUNE 1&2 ..... Select Autotune, Loop 1 & 2
AUTO TUNE LP1 ..... Select Autotune, Loop 1
AUTO TUNE LP2 ..... Select Autotune, Loop 2
BROADCAST DIS ..... Disable Broadcast
BTH BCD1 PGNO ..... BCD Bit 0 of program number for loop 1 & 2
BTH BCD2 PGNO ..... BCD Bit 1 of program number for loop 1 & 2
BTH BCD3 PGNO ..... BCD Bit 2 of program number for loop 1 & 2

BTH BCD4 PGNO ..... BCD Bit 3 of program number for loop 1 & 2
BTH BCD5 PGNO ..... BCD Bit 4 of program number for loop 1 & 2
BTH BCD6 PGNO ..... BCD Bit 5 of program number for loop 1 & 2
BTH BCD7 PGNO ..... BCD Bit 6 of program number for loop 1 & 2
BTH BCD8 PGNO ..... BCD Bit 7 of program number for loop 1 & 2
CASCADE TUNE ..... Select Cascade Tune
CASCDE ENABLE ..... Enable Cascade Control
CLEAN PROBE ..... Clean Probe (Carbon Potential)
DIG COMMS DIS ..... Disable Digital Comms
DIG RETRA DIS ..... Disable Digital Retransmission
FRZ INTEG 1&2 ..... Freeze Integral, Loop 1 & 2
FRZ INTEG LP1 ..... Freeze Integral, Loop 1
FRZ INTEG LP2 ..... Freeze Integral, Loop 2
GAIN SCHE 1&2 ..... Select Gain Scheduling, Loop 1 & 2
GAIN SCHE LP1 ..... Select Gain Scheduling, Loop 1
GAIN SCHE LP2 ..... Select Gain Scheduling, Loop 2
HOLD ..... Hold Program
HOLD ALL TLSR ..... Hold all totalisers
HOLD RUN ..... Hold or Run Program (depending on state)
HOLD TLSR 1 ..... Hold Totaliser 1
HOLD TLSR 2 ..... Hold Totaliser 2
HOLD TLSR 3 ..... Hold Totaliser 3
HOLD TLSR 4 ..... Hold Totaliser 4
HOLDBACK DIS ..... Disable Holdback
KEYLOCK ENABL ..... Lock Keys on Front Panel
LOAD PROG 1&2 ..... Load program, loop 1 & 2
LOAD PROG LP1 ..... Load program, loop 1
LOAD PROG LP2 ..... Load program, loop 2
LOWER KEY ..... Function as 'lower' key
LP1 2LSD PGNO ..... Bit 1 of program number for loop 1
LP1 2LSD SCHD ..... Gain Scheduling set number for loop 1, bit 1
LP1 3LSD PGNO ..... Bit 2 of program number for loop 1
LP1 BCD1 PGNO ..... BCD Bit 0 of program number for loop 1
LP1 BCD2 PGNO ..... BCD Bit 1 of program number for loop 1
LP1 BCD3 PGNO ..... BCD Bit 2 of program number for loop 1
LP1 BCD4 PGNO ..... BCD Bit 3 of program number for loop 1
LP1 BCD5 PGNO ..... BCD Bit 4 of program number for loop 1
LP1 BCD6 PGNO ..... BCD Bit 5 of program number for loop 1
LP1 BCD7 PGNO ..... BCD Bit 6 of program number for loop 1
LP1 BCD8 PGNO ..... BCD Bit 7 of program number for loop 1
LP1 LSD PRGNO ..... Bit 0 of program number for loop 1
LP1 LSD SCHD ..... Gain Scheduling set number for loop 1, bit 0
LP1 MSD PRGNO ..... Bit 3 of program number for loop 1
LP1 MSD SCHD ..... Gain Scheduling set number for loop 1, bit 2

LP1 SKIP SEG ..... Skip Segment, Loop 1
LP1 WAIT UNTL ..... Wait until, loop 1
LP2 2LSD PGNO ..... Bit 1 of program number for loop 2
LP2 2LSD SCHD ..... Gain Scheduling set number for loop 2, bit 1
LP2 3LSD PGNO ..... Bit 2 of program number for loop 2
LP2 BCD1 PGNO ..... BCD Bit 0 of program number for loop 2
LP2 BCD2 PGNO ..... BCD Bit 1 of program number for loop 2
LP2 BCD3 PGNO ..... BCD Bit 2 of program number for loop 2
LP2 BCD4 PGNO ..... BCD Bit 3 of program number for loop 2
LP2 BCD5 PGNO ..... BCD Bit 4 of program number for loop 2
LP2 BCD6 PGNO ..... BCD Bit 5 of program number for loop 2
LP2 BCD7 PGNO ..... BCD Bit 6 of program number for loop 2
LP2 BCD8 PGNO ..... BCD Bit 7 of program number for loop 2
LP2 LSD PRGNO ..... Bit 0 of program number for loop 2
LP2 LSD SCHD ..... Gain Scheduling set number for loop 2, bit 0
LP2 MSD PRGNO ..... Bit 3 of program number for loop 2
LP2 MSD SCHD ..... Gain Scheduling set number for loop 2, bit 2
LP2 SKIP SEG ..... Skip Segment, Loop 2
LP2 WAIT UNTL ..... Wait until, loop 2
NONE ..... No Function
OP RATLIM 1&2 ..... Output Power Rate limit, Loop 1 & 2
OP RATLIM LP1 ..... Output Power Rate limit, Loop 1
OP RATLIM LP2 ..... Output Power Rate limit, Loop 2
RAISE KEY ..... Function as 'raise' key
RAT SP2 ENAB ..... Enable Ratio Setpoint 2
RATIO ENABLE ..... Enable Ratio Control
REM ENABL 1&2 ..... Remote Input Enable, Loop 1 & 2
REM ENABL LP1 ..... Remote Input Enable, Loop 1
REM ENABL LP2 ..... Remote Input Enable, Loop 2
RESET ..... Reset Program
RESET TLSR 1 ..... Reset Totaliser 1
RESET TLSR 2 ..... Reset Totaliser 2
RESET TLSR 3 ..... Reset Totaliser 3
RESET TLSR 4 ..... Reset Totaliser 4
RST ALARM 1-4 ..... Reset alarms 1 to 4
RST ALARM 5-8 ..... Reset alarms 5 to 8
RST ALL TLSR ..... Reset all totalisers
RST DELAY ALM ..... Reset all alarms
RUN ..... Run Program
RUN HOLD ..... Run or Hold Program (depending on state)
RUN RESET ..... Run or Reset Program (depending on state)
SELECT IP 2 ..... Select Second Input
SP RATLIM 1&2 ..... Setpoint Rate limit, Loop 1 & 2
SP RATLIM LP1 ..... Setpoint Rate limit, Loop 1

SP RATLIM LP2 ..... Setpoint Rate limit, Loop 2
SP1 LOOP1 ..... Select SP1 on loop 1
SP1 LOOP2 ..... Select SP1 on loop 2
SP1 LPS 1&2 ..... Select SP1 on loop 1 & 2
SP2 ENABL 1&2 ..... Second Setpoint Enable, Loop 1 & 2
SP2 ENABL LP1 ..... Second Setpoint Enable, Loop 1
SP2 ENABL LP2 ..... Second Setpoint Enable, Loop 2
STANDBY ENABL ..... Enable Standby Mode
TELEMETRY ..... Enable telemetry
TIMER 1 ON ..... Turn Timer 1 on
TIMER 2 ON ..... Turn Timer 2 on
TIMER 3 ON ..... Turn Timer 3 on
TIMER 4 ON ..... Turn Timer 4 on
TIMER DISABL ..... Disable Timer functions

Chapter 6

CALIBRATION

Contents Page

INTRODUCTION

Although it should never be necessary to calibrate your instrument, 900 EPC Series controllers may be recalibrated from the instrument front panel or using a PC and digital communications.
If recalibration is required, we recommend that you follow the first method presented below in the first instance: this consists of an operation that restores the factory calibration stored in non-volatile memory. However, if you require a more precise calibration and are in possession of the equipment that is required, you may follow the second method which gives a standard calibration method for the inputs and outputs used in the 900 EPC.

Note : EUROTHERM offers a recalibration and planned calibration service. For more details, contact your local EUROTHERM sales office.

It is not necessary to recalibrate the 900 EPC when an input has been reconfigured (for example when changing a sensor or rescaling). If, however, a measured value seems to be inaccurate, you should check your connections and your leads before considering a recalibration. The second method given below may be either fully or partially applied.

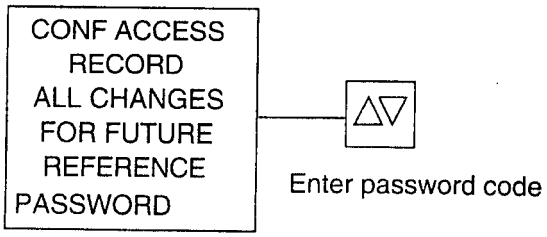
METHOD 1: RESTORING THE FACTORY CALIBRATION

All inputs and outputs are calibrated in the factory. The calibration values are stored in a non-volatile memory device, divided into 3 groupings: Loop 1, Loop 2, and Modules. These values are also stored in a second non-volatile memory save area. A full set of default parameter values is also stored in a read-only memory. To use these stored values, it is first necessary to enter Calibration mode: the access to this is made via Configuration mode.

* Cut off the Power Supply to the 900 EPC

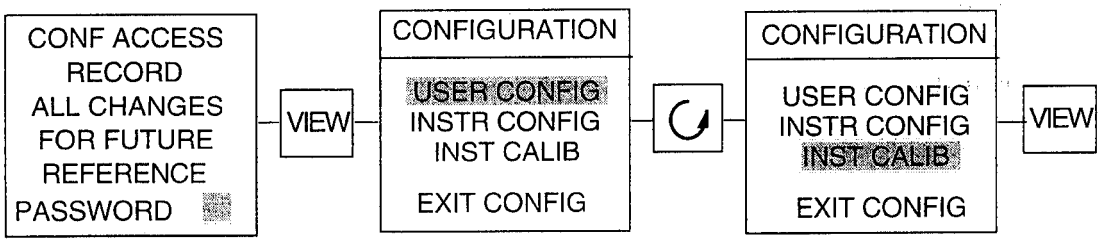
* Re-apply power, pressing PAGE and (VIEW) together.

The following screen will appear :



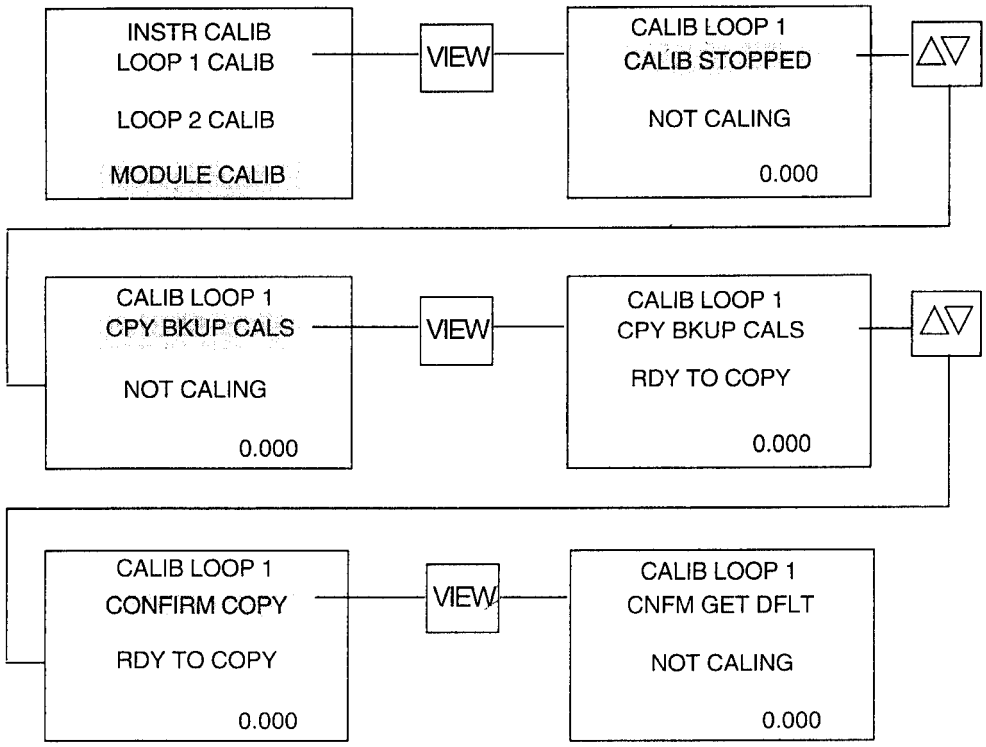
Enter the password code using Δ and ∇: press (VIEW) when it is correctly displayed.

If the code has been entered correctly, the following screen will appear, and you should follow the procedure indicated.



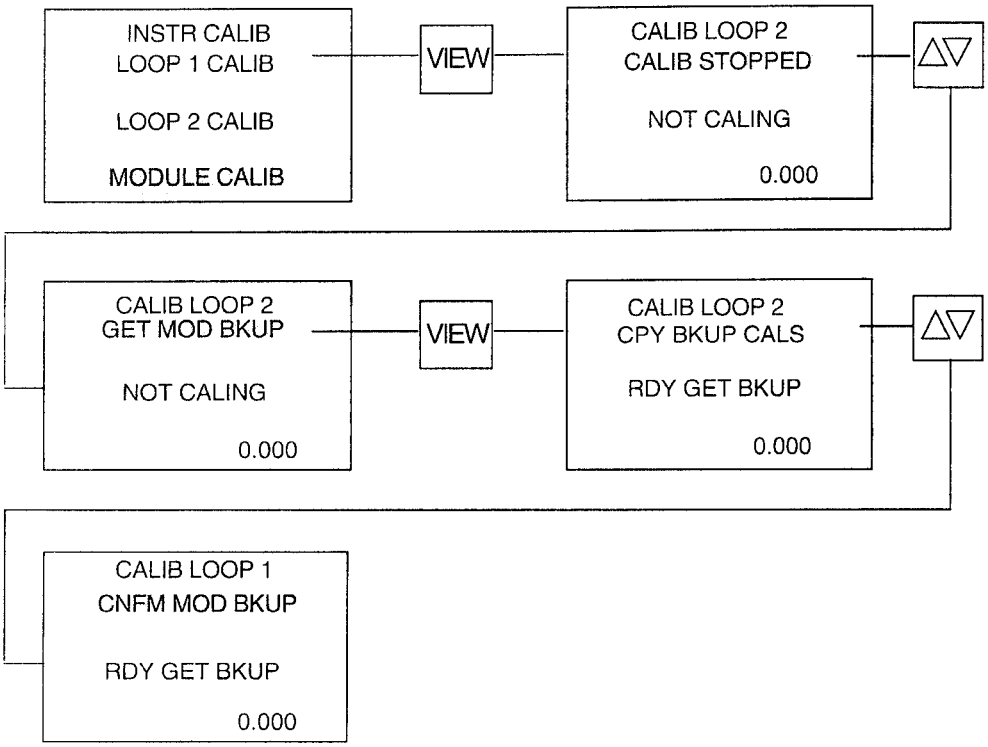
Saved Values for Loops 1 and 2

To restore the calibration values for inputs and outputs, follow this procedure:



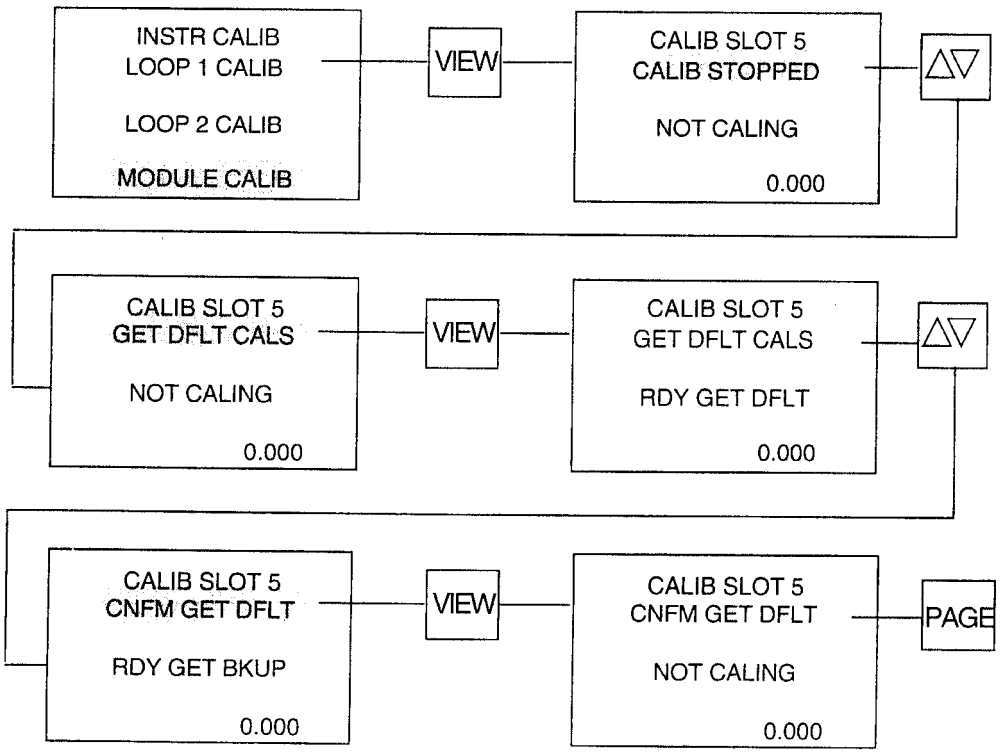
Saved Values for Modules

To restore the saved values for modules, follow the procedure given below:



Default Parameter Values

If it is necessary to recalibrate, you may also wish to reset parameters to their default settings. These are values that are suitable for most processes, and provide a suitable basis for the calibration operation.
To restore these values, follow this procedure:



METHOD 2: CALIBRATION OF INPUTS AND OUTPUTS

Equipment Required for Calibration

To carry out a complete calibration operation, you will need the following equpment:

A voltage source giving volts and millivolts, accurate and stable, covering the ranges described on subsequent pages (e.g. EUROTHERM 239)
A length of compensation cable suitable for the thermocouple being used
A zero reference or a compensated mV source (e.g. EUROTHERM 239)
A digital voltmeter capable of displaying a maximum voltage of 11Vdc with an accuracy better than 0.02% and an input impedance greater than 5MOhms
A digital current meter capable of displaying a maximum of 22mA dc with an accuracy better than 0.05% and an input impedance less than 1 Ohms
One or two decade boxes (for RTD Calibration)

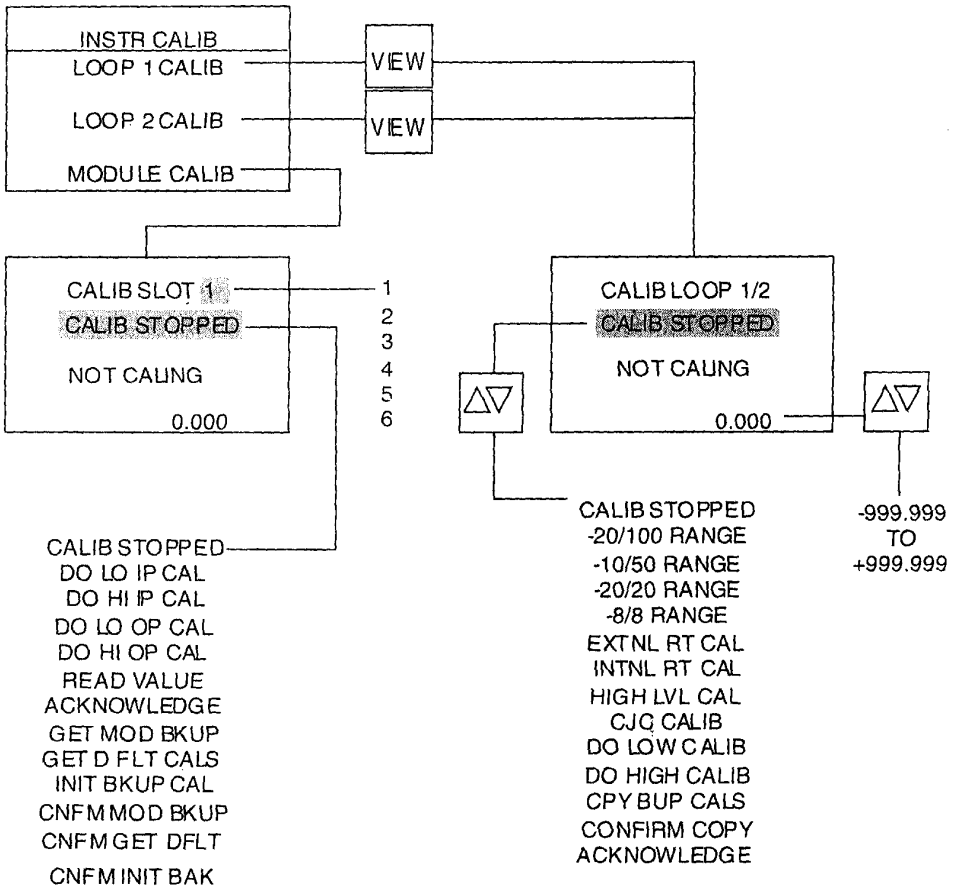
When the instrument is despatched from the factory, it has been calibrated for all thermocouples, RTD's, pyrometers, voltage and current inputs, DC Control output, and if a remote input or retransmission output has been specified in the ordering code, these will also have been calibrated..
Before starting the recalibration, note that you can always restore these factory calibration values in case of problems.

Precautions

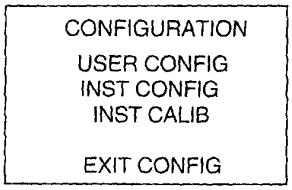
Apply power to the equipment being used for the calibration and allow the ambient temperature to stabilise for 45 minutes. Similarly, apply power to the controller being calibrated 30 minutes before commencing with the recalibration. Do not recalibrate if the ambiant temperature is outside the range +10°C to +30°C.
Ensure that the controller is positioned at an angle of about 15° to the horizontal during the warm up and calibration procedure to allow air to circulate.
It is possible to obtain an excellent result if you follow this procedure carefully. However, it is the responsibility of the engineer to ensure that the calibration is correctly carried out and that the accuracy of the calibration conforms to the specifications of the instrument.

Calibration Parameters

Use the following procedure to access the calibration parameters:



To exit from calibration at any time, press PAGE several times until the following screen is displayed:



Select EXIT CONFIG using ◯ and press (VIEW) to confirm the operation. The controller will redisplay the main screen.

Process Inputs

General

Input types of the following types may be calibrated:

Low level (mV), High level (Volts), Resistance Thermometer, and CJC

The table below shows the inputs and their respective ranges.
Before proceding with a recalibration, ensure that the controller is configured for a linear input (see chapter 5) and check that the input and display ranges are within the limits of the thermocouple type.

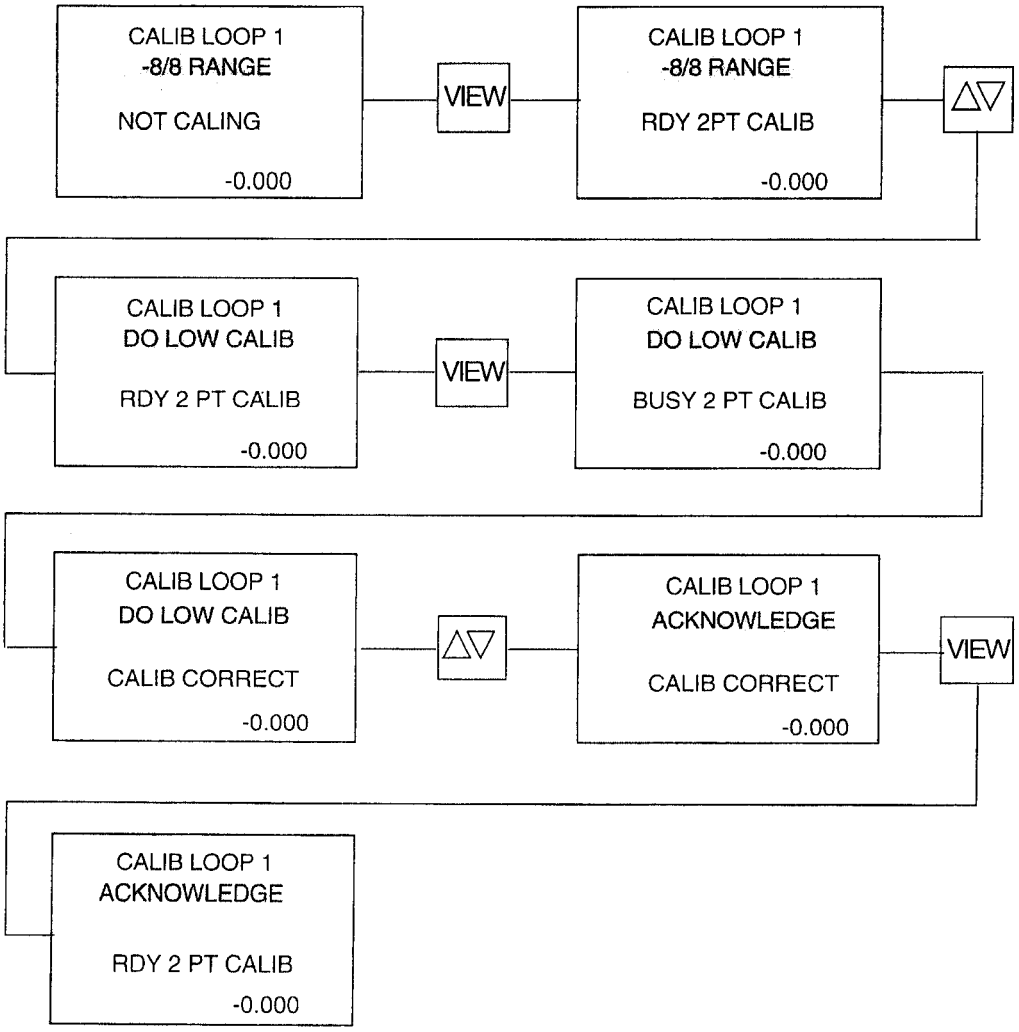
Input Type	Range		Calibration Input	
	Low Point	High Point	Low Point	High Point
mV Signal	-8mV -20mV -10mV -20mV	+8mV +20mV +50mV +100mV	0.0mV 0.0mV 0.0mV 0.0mV	8mV±20µV 20mV±20µV 40mV±40µV 80mV±80µV
High Level	-10V	+10V	0.0V	10V±10mV
RTD	0 Ω	390 Ω	50 Ω	250 Ω

mV and Volt Inputs

* Put the 900 EPC in calibration mode
* Select the loop to calibrate with ◯ and confirm with (VIEW)
* Select the calibration range mV with Δ or ∇ and confirm with (VIEW)
* Connect the Process input which is to be calibrated to the external source
* The calibration is performed at two points, the low and the high points. It is essential that you start by calibrating the low point

Calibrating the Low Point

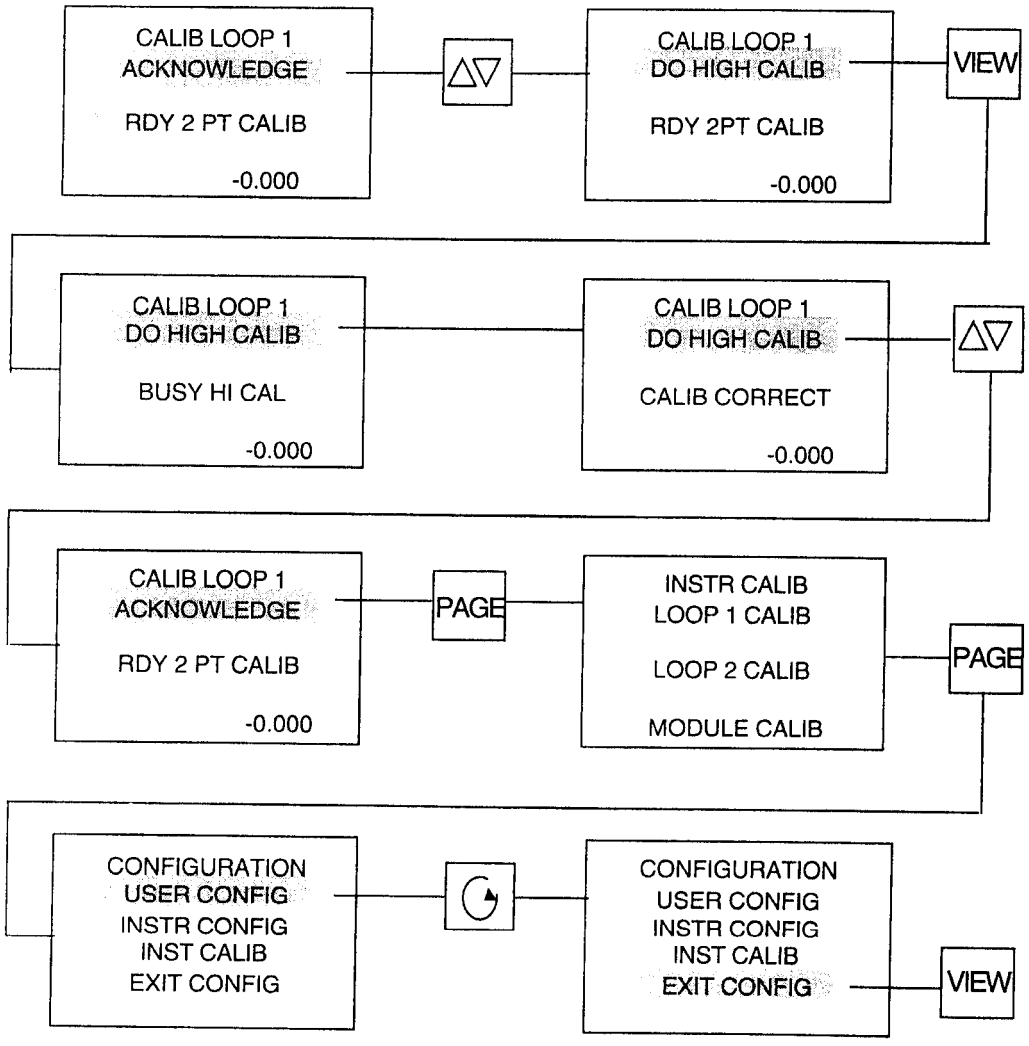
Apply the voltage that corresponds to the low point (see the table on page 6-9) to the terminals of the input for the loop being calibrated, and then follow the procedure below:



Example : For the range -8 to +8mV, you need to apply 0mV

Calibrating the High Point

Apply the voltage corresponding to the high point (see the table on page 6-9) to the terminals of the input of the loop being calibrated, then proceed as follows:



Example: For the range -8 to +8mV, you will need to apply 8mV

Resistance Thermometer

Connect the process input in the manner shown in the diagram opposite. If both inputs are to be calibrated (e.g. for a dual loop controller), connect two decade boxes. The resistance of the lead between the 900 EPC and the decade box must be reduced to the minimum possible in order to increase the precision of the calibration. Use copper wire in short lengths and ensure that there is a good contact at the screw terminal (do not use an intermediate connector).
Before applying power to the 900 EPC, ensure that the connection to the decade box(es) has been made correctly. During the calibration, the resistance thermometer input must never become open circuit: otherwise the stabilisation time of the calibration will increase and the precision will decrease.
Put the 900 EPC in calibration mode.

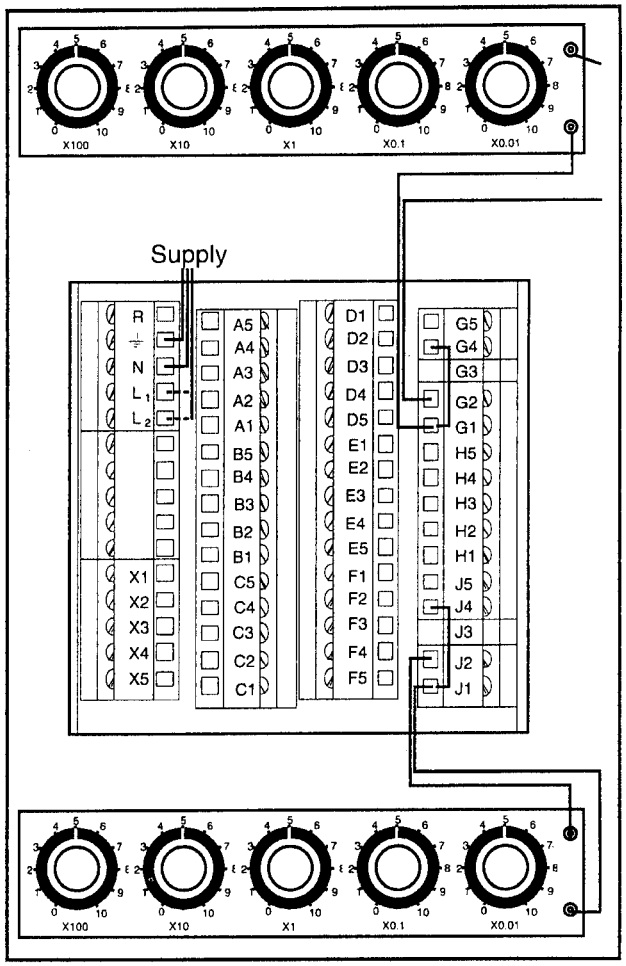


Figure 6-1

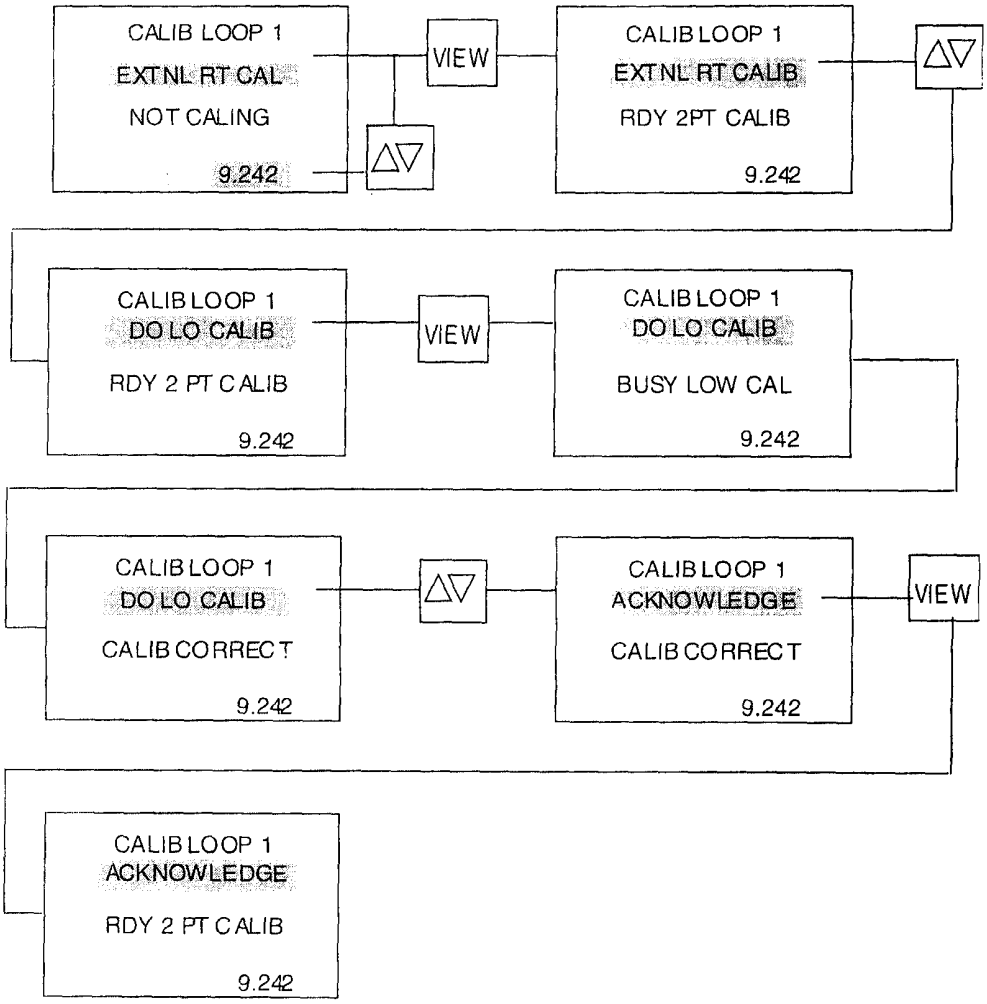
* Select the loop to calibrate with ◯ and confirm with (VIEW)

* The calibration is performed at two points, the low and the high. It is essential to start with the low point calibration.

IMPORTANT : The linear -20 to +100mV input must be correctly calibrated before proceding with the internal calibration of the RTD.

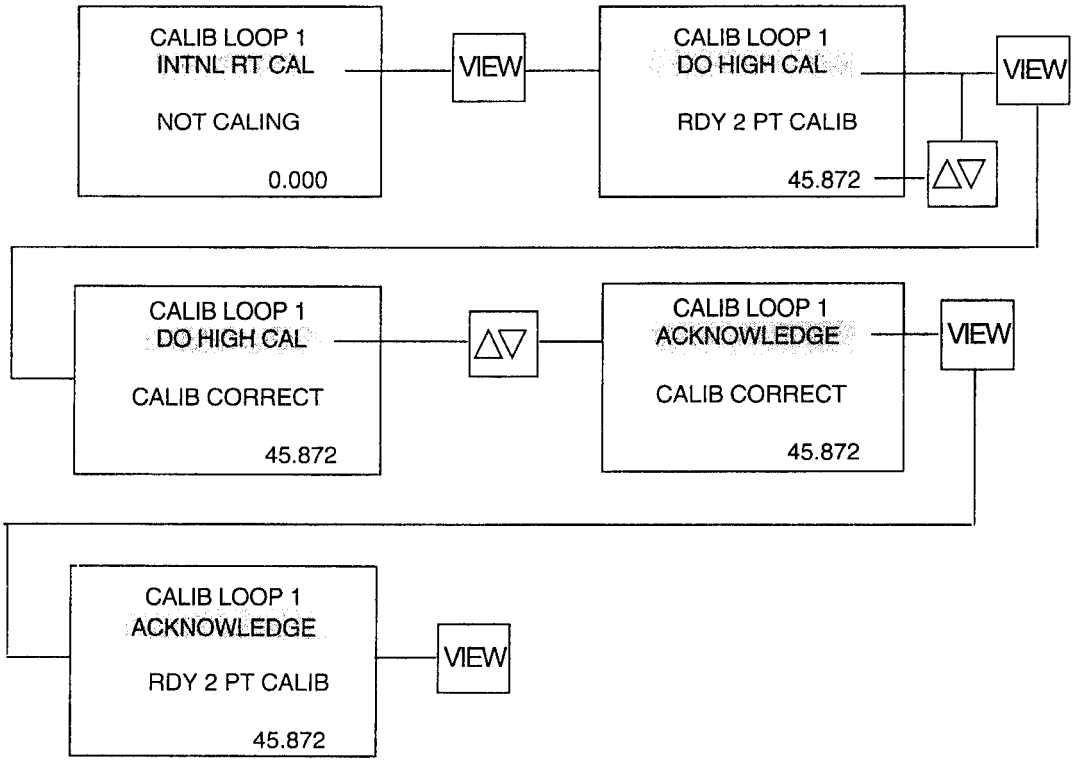
Calibrating the Low Point

* Set the decade box to 50 W . Wait 4 minutes
* Select INTNL TR CAL followed by DO LOW CALIB and store the calibration usnig ACKNOWLEDGE



Calibrating the High Point

* Set the decade box to 250 W . Wait 2 minutes.
* Select DO HIGH CALIB and store the calibration using ACKNOWLEDGE



Cold Junction Compensation (CJC)

Whatever type of thermocouple you are using, the CJC calibration may be performed with a K type thermocouple. As a prerequisite, therefore, you should reconfigure the controller to use a K type thermocouple.

* Configure the display range to -50 to +50°C with a resolution of 1 decimal place.
* Check that the CJC is set to internal (INTERNAL CJC).
* Before proceeding with the CJC calibration, ensure that the mV calibration for the input has been correctly performed.
* Exit configuration mode.
* Each loop (for a dual loop controller) has an independant CJC and you will need to calibrate both of these.
* Connect a mV source (Model 239) as indicated in the diagram opposite, being careful to observe the correct polarity, and place the protective sleeve on the rear connector,
* Select type K using the switch on the 239 voltage source.
* Apply 0 volts and ensure that air may circulate freely from the bottom of the the rear connector to the top.
* Enter configuration mode and select the loop required (LOOP 1/LOOP 2)
* Wait 5 minutes to allow the CJC to stabilise
* Follow the procedure on the next page.

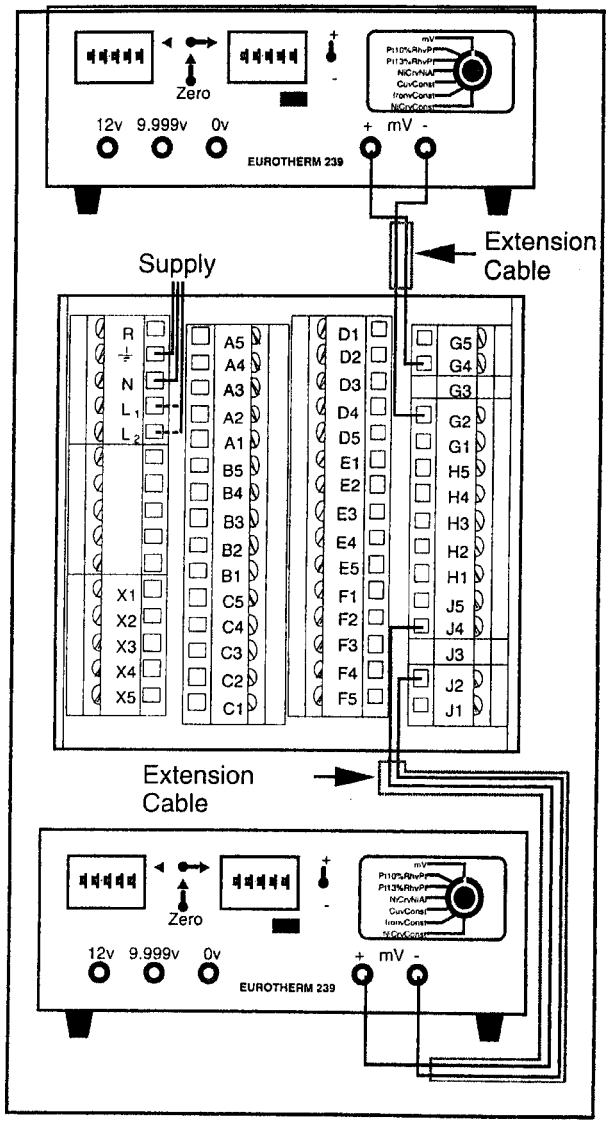
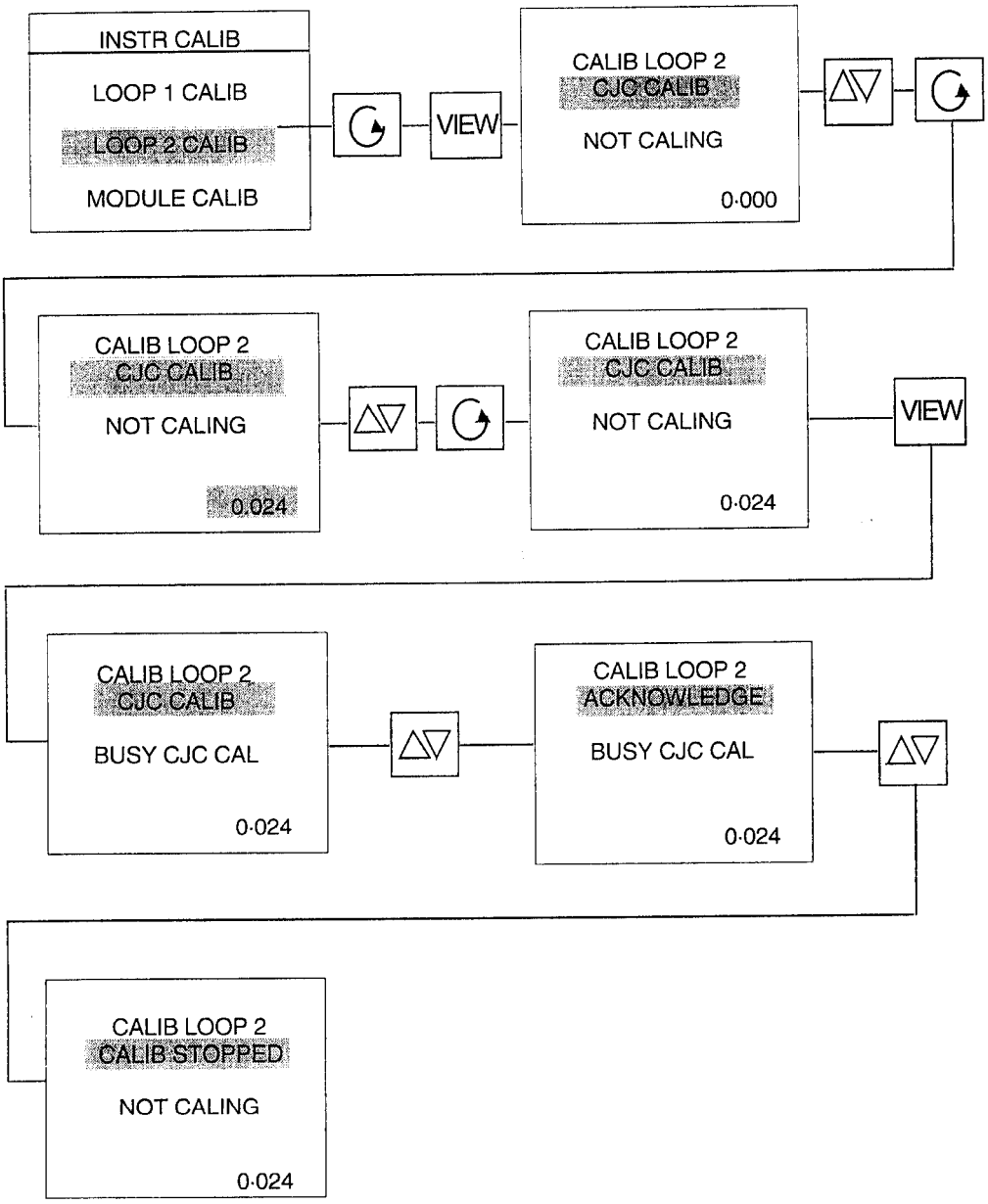


Figure 6-2



* Exit calibration using the PAGE key.
* Reconfigure the thermocouple back to that originally configured.
* Exit configuration mode using EXIT CONF using ◯ and confirming with (VIEW)

Calibrating Modules

DC Input

You do not need to reconfigure the instrument to calibrate the DC Input module. If you are using a current input, you will have to remove the shunt located on the rear connector.

* Connect a millivolt source (Model 239) as indicated in the diagram opposite.
* Enter configuration mode
* Select MODULE CALIB using ◯ and confirm with (VIEW)
* Enter (using Δ or ∇) the slot number of the input module (to determine the slot number of the module).
* Apply 0 volts and wait 1 minute.
* Select DO LO IP CAL with ◯ and confirm with (VIEW)
* When the message: CALIB CORRECT is displayed, select ACKNOWLEDGE with Δ or ∇ and confirm with (VIEW)

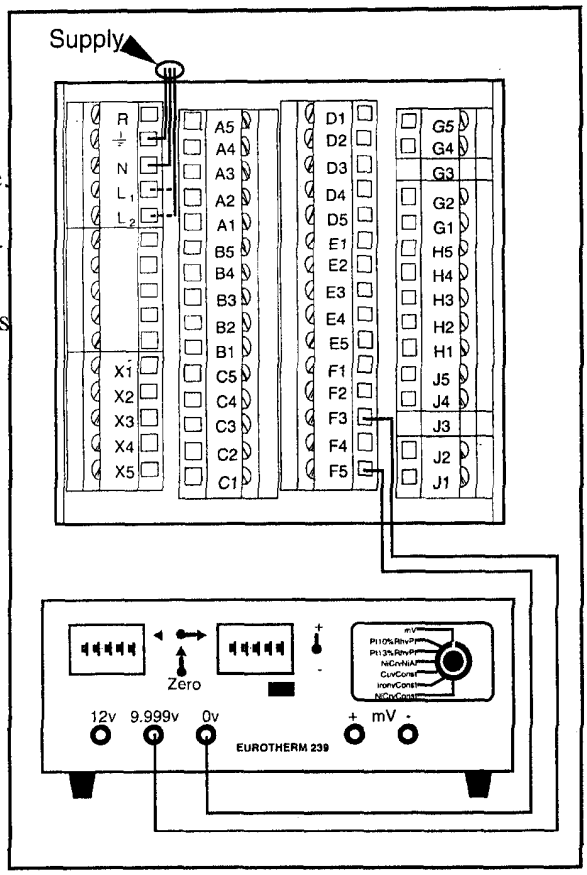
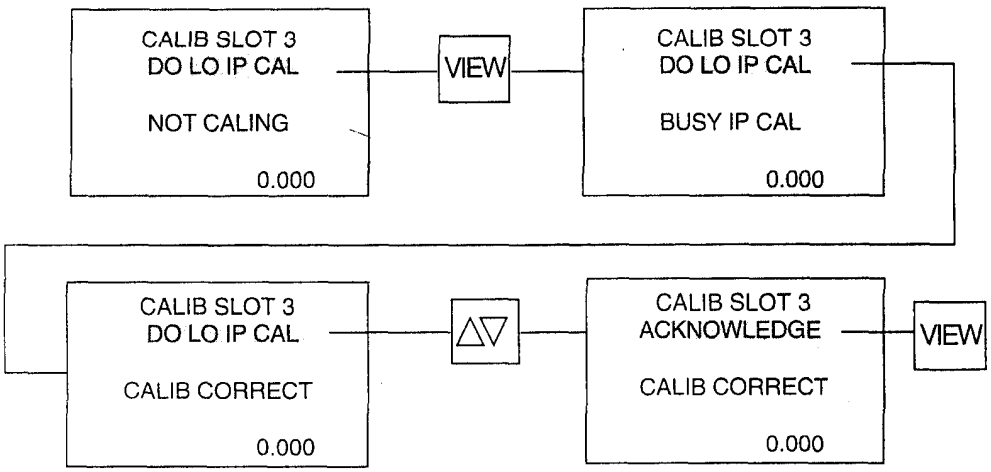
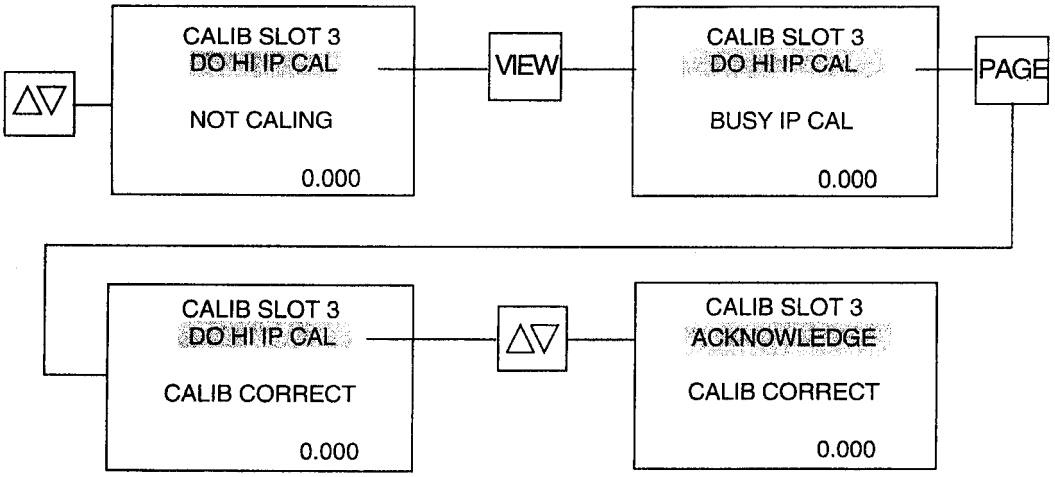


Figure 6-3



* Now apply 9.999 Volts and wait 1 minute
* Select DO HI IP CAL with Δ or ∇ and confirm with (VIEW)
* When the message CALIB CORRECT is displayed , select ACKNOWLEDGE with Δ or ∇ and confirm with (VIEW)



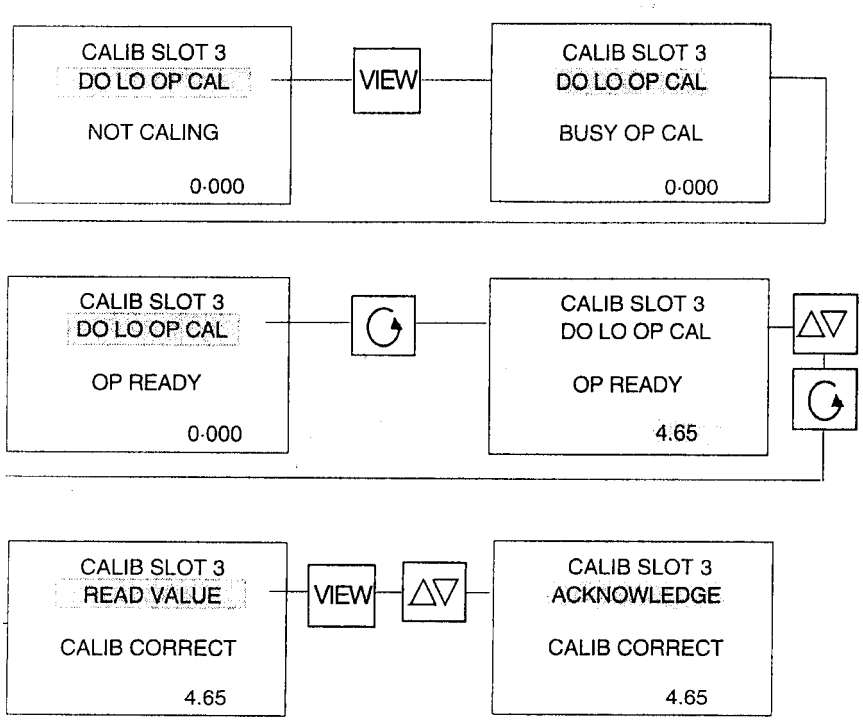
* Exit calibration by pressing PAGE

Control and Retransmission Outputs

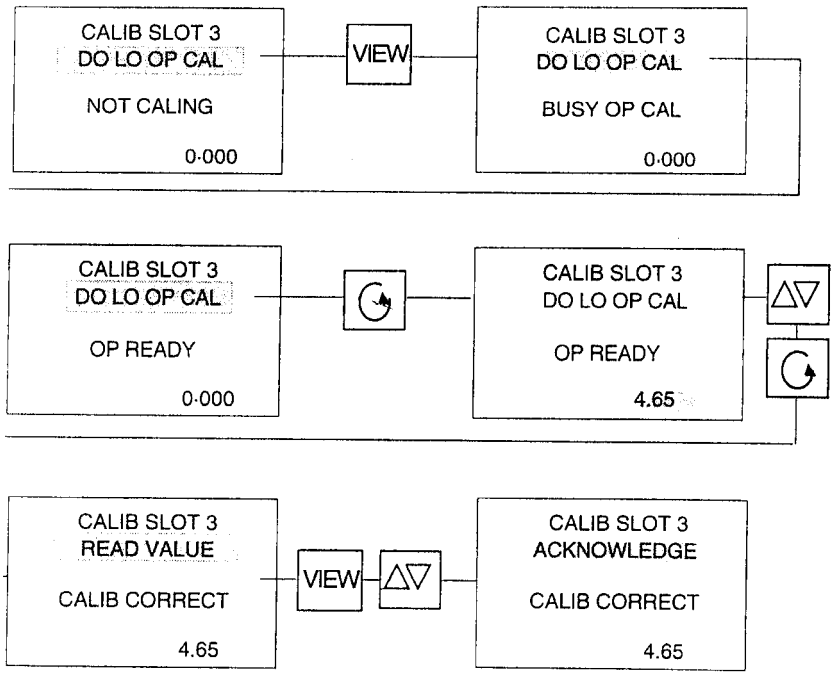
There are two kinds of output modules that may require calibration: the DC Control module and the DC Analogue Retransmission module. It is not necessary to reconfigure the instrument to calibrate the output modules.

* Connect the output module to a multimeter using the current or voltage input according to the module type
* Enter calibration mode (see chapter 5)
* Select MODULE CALIB with ◯ and confirm with (VIEW)
* Enter using Δ or ∇ the slot number of the output module (to determine the slot number, refer to chapter 5).
* Wait one minute so that the 900 EPC can stabilise.
* Select DO LO OP CAL with ◯ and confirm with (VIEW)
* When the message: OP READY is displayed, press ◯ to select the value displayed at the bottom right. Use Δ or ∇ to display the value read from the multimeter.
* Select READ VALUE using ◯. Confirm with (VIEW) .

* Select ACKNOWLEDGE using Δ or ∇ and confirm with (VIEW)



* Proceed to calibrate the high point in the same way but selecting DO HI OP CAL



Calibration Error Messages

If the calibration procedure encounters an error, one of the following messages will be displayed instead of CALIB CORRECT:

LOW CAL ERR	The input is within range but outside the specification for the calibraton
HIGH CAL ERR	The input is within range but outside the specification for the calibration.
INPUT COUNT 0	The input is out of range
OFFSET ERROR	The control input is malfunctionning
SOURCE NOISY	The calibration source is noisy
CJC IP ERR	There is a sensor break condition. Check the cabling, the input linearisation and the display range.
ERR CSF	The value entered for the CJC bears no relation to the reading in the instrument. Recalibrate, taking care to enter the correct value from the bottom right of the display: 0.000 unless the calibration point is not 0.
VAL OUTSD RNG	This message may be displayed during a calibration of and RTD or a DC Output module. It indicates that the value entered is too far from the nominal value: recheck the value entered and the precision of the multimeter.
MODULE ABSENT	The module to calibrate is not present or is damaged. Check the module number using the SLOT OCCUPANCY menu.

Calibration: Operator Errors

If you make a mistake when calibrating, or wish to restart from scratch, simply press Δ or ∇ whereupon CALIB STOPPED will be displayed on the main screen.

Chapter 7

DIAGNOSTICS

Contents Page

GENERAL

There are various screens that can be displayed to help with solving faults, errors, etc. The main screens are in level 3 of the instrument.

WARNING INDICATION DISPLAYS

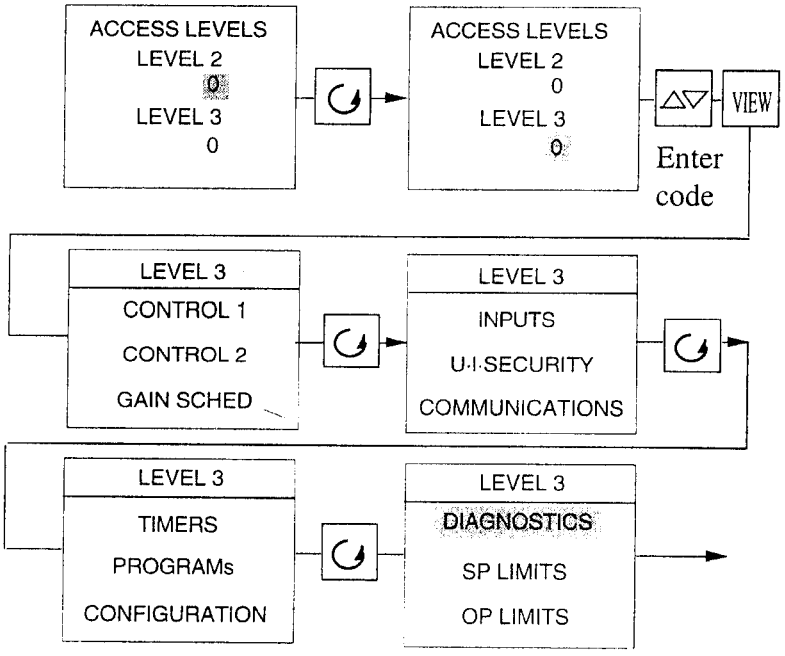
HARDWARE IN INSTRUMENT CHANGED CHECK CONFIGURATION

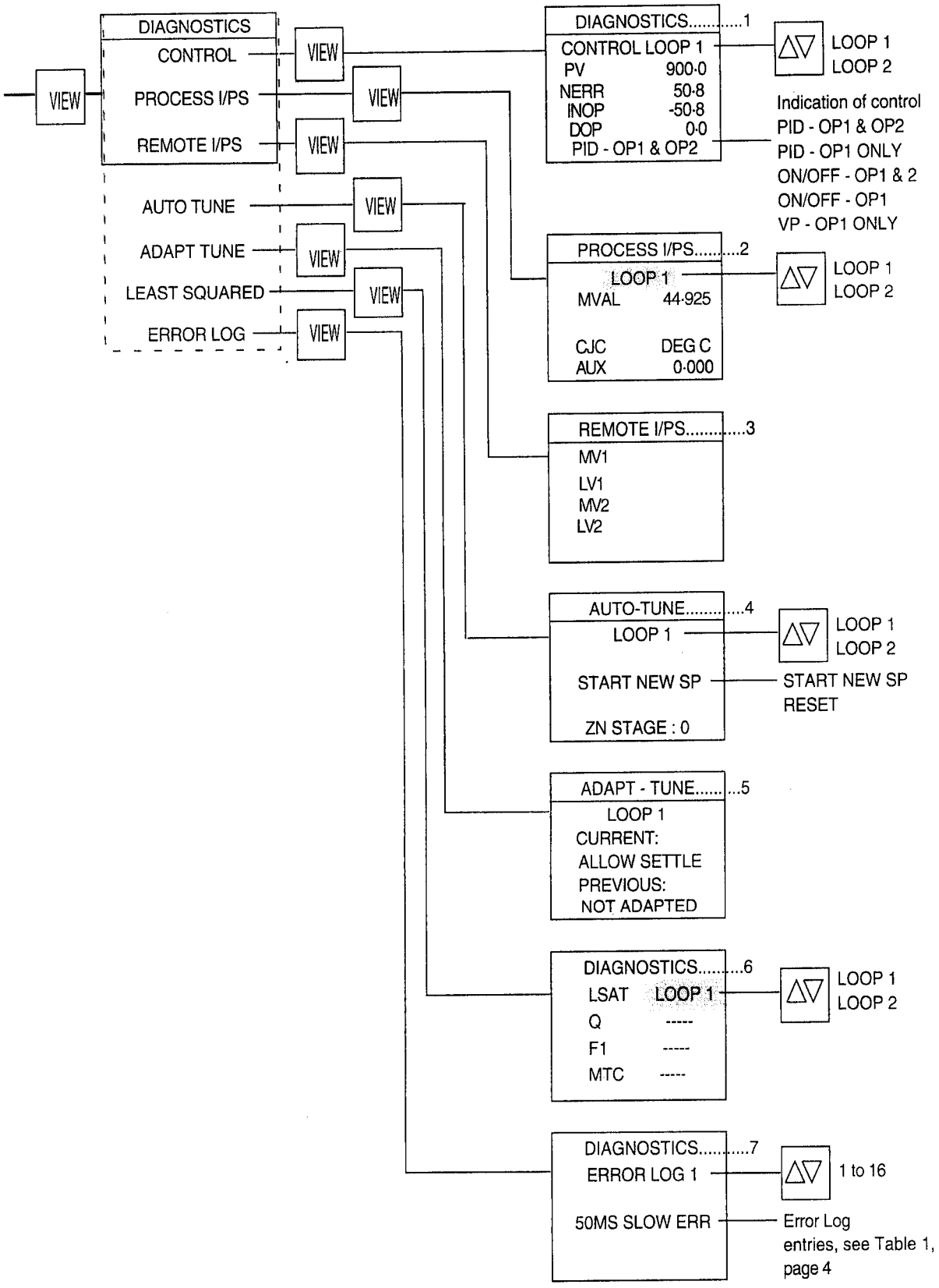
NVOL MEMORY CORRUPTED INSTRUMENT IN STANDBY MODE

If one of these messages is displayed on switching on the instrument switch off the instrument and enter the configuration mode as described in chapter 4. Check and correct where necessary the complete configuration of the instrument. If indications still persist, contact your nearest Eurotherm Service Engineer.

ACCESS TO DIAGNOSTIC SCREENS

To enter the Diagnostic Screens in Level 3 proceed as follows:-




DIAGNOSTICS
CONTROL
PROCESS I/PS
REMOTE I/PS
AUTO TUNE
ADAPT TUNE
LEAST SQUARED
ERROR LOG
VIEW
DIAGNOSTICS.....1
CONTROL LOOP 1
PV 900·0
NERR 50·8
INOP -50·8
DOP 0·0
PID - OP1 & OP2
LOOP 1
LOOP 2
Indication of control
PID - OP1 & OP2
PID - OP1 ONLY
ON/OFF - OP1 & 2
ON/OFF - OP1
VP - OP1 ONLY
PROCESS I/PS.....2
LOOP 1
MVAL 44·925
CJC DEG C
AUX 0·000
REMOTE I/PS.....3
MV1
LV1
MV2
LV2
AUTO-TUNE.....4
LOOP 1
START NEW SP
ZN STAGE : 0
START NEW SP
RESET
ADAPT - TUNE.....5
LOOP 1
CURRENT:
ALLOW SETTLE
PREVIOUS:
NOT ADAPTED
DIAGNOSTICS.....6
LSAT LOOP 1
Q -----
F1 -----
MTC -----
DIAGNOSTICS.....7
ERROR LOG 1
50MS SLOW ERR
1 to 16
Error Log
entries, see Table 1,
page 4

There are several diagnostic screens in the Series 900 instruments:-

1. Control
   This screen provides information relating to the current state of the control algorithm. Three parameters are displayed, normalised error (NERR), integral output (INOP) and derivative output (DOP) together with a reminder of the control definition configuration.
2. Inputs
   This provides information about the raw measured values for process and remote inputs. It also indicates, if appropriate, the CJC temperature.
3. Remote Inputs
   This page shows the Measured Value in input units (volts, mA) and the linearised value of engineering units.
4. Auto Tune
   This page can be used to observe the progress of the auto tuner.
5. Adapt Tune
   The page displays the current status of the DRA adaptive tuner and the previous (most recent) tuning strategy used by DRA.
6. Least Squared
   This page displays three parameters, Q, F1 and MTC (model time constant) that relate to the LSAT tuner. They are meaningful only to control engineers who are experienced in Eurotherm's proprietary tuning algorithms.
7. Error Log
   This page displays the last 16 errors logged by the software and can be used to diagnose both process and instrument problems. For example, the error log will record the fact that an input has gone overrange. The log is viewed by altering the number displayed by Error log and cleared by scrolling the cursor on to 'CLEAR ERR LOG' and depressing the VIEW key.
8. Digital Inputs
   This screen shows a represntation of the state of the digital inputs (Maximum of 24)
9. Master Comms
   This screen shows the state of each of the 8 channels of master communications.
10. Csd Auto Tune (Cascade Auto Tune)
    This screen shows the current status of a cascade auto tune operarion.

Table 1 Instrument Errors

Display	State
NO ERROR LOGD	No log error
WATCHDOG ERR	Watchdog error
SW WTCHDG ERR	Software watchdog error
UNINIT INT ER	Uninitialised interrupt error
CFG CCKSM ERR	Configuration data checksum error
NVOL READ ERR	Nonvolatile memory read access error
NVOL WRITE ER	Nonvolatile memory write access error
NVOL TEST ERR	Nonvolatile memory test pattern corruption

RAM TEST ERR	RAM test pattern corruption error	
STACK ERROR	Stack error	
ASIC 1 ERROR	ASIC 1 error	
RTC ERROR	RTC error	
SPI BUS ERROR	SPI bus failure	
5OMS SLOW ERR	50ms tasks too slow	
CAL INIT ERR	Calibration value out of limits	
IIC BUS ERROR	I C bus failure	
LOW BATTERY	Low battery	
L1 POT POS OC	VP position pot oc loop 1	(open circuit - reads 127)
L1 POT POS SC	VP position pot sc loop 1	(short circuit - reads 0)
L2 POT POS OC	VP position pot oc loop 2	(open circuit - reads 127)
L2 POT POS SC	VP position pot sc loop 2	(short circuit - reads 0)
L1 PV OVRNG	PV input overrange loop 1	(sensor break)
L1 PV UNDRNG	PV input underrange loop 1	(sensor break)
L1P EIDS NRDY	PV input eids not ready loop 1	(reset inst)*
L1P 6805 NRDY	PV input 6805 not ready loop 1	(reset inst)*
L2 PV OVRNG	PV input overrange loop 2	(sensor break)
L2 PV UNDRNG	PV input underrange loop 2	(sensor break)
L2 EIDS NRDY	PV input eids not ready loop 2	(reset inst)*
L2P 6805 NRDY	PV input 6805 not ready loop 2	(reset inst)*
L1 REM OVRNG	Remote input overrange loop 1	(sensor break)
L1 REM UNDRNG	Remote input underrange loop 1	(sensor break)
L1R EIDS NRDY	Remote input eids not ready loop 1	(sensor break)
L1R 6805 NRDY	Remote input 6805 not ready loop 1	(sensor break)
L2 REM OVRNG	Remote input overrange loop 2	(sensor break)
L2 REM UNDRNG	Remote input underrange loop 2	(sensor break)
L2R EIDS NRDY	Remote input eids not ready loop 2	(sensor break)
L2R 6805 NRDY	Remote input 6805 not ready loop 2	(sensor break)
L1 EIDS ST ER	PV input eids selftest failure loop 1	(reset inst)*
L1 TMR ST ERR	PV input timer selftest failure loop 1	(reset inst)*
L1 ROM ST ERR	PV input rom selftest failure loop 1	(reset inst)*
L2 EIDS ST ER	PV input eids selftest failure loop 2	(reset inst)*
L2 TMR ST ERR	PV input timer selftest failure loop 2	(reset inst)*
R2 ROM ST ERR	PV input rom selftest failure loop 2	(reset inst)*
R1 EIDS ST ER	Remote input eids selftest failure loop 1	(sensor break)
R1 TMR ST ERR	Remote input timer selftest failure loop 1	(sensor break)
R1 ROM ST ERR	Remote input rom selftest failure loop 1	(sensor break)
R2 EIDS ST ER	Remote input eids selftest failure loop 2	(sensor break)
R2 TMR ST ERR	Remote input timer selftest failure loop 2	(sensor break)
R2 ROM ST ERR	Remote input rom selftest failure loop 2	(sensor break)

* In the event of a hardware failure relating to a PV input, the instrument resets in an attempt to clear the error. A failure of PV1 6805 would also lock out the keys.
Remote inputs with a hardware fault are ignored and the software uses the sensor break strategy.

Chapter 8

PROGRAMMER

Contents Page

(Contents continued)

INTRODUCTION

Programmers are available in both single and dual loop format. Any programme may be loaded and run on any loop. A single programme can be run on each loop or separate, closely linked programmes, can be run simultaneously.

If different programmes are assigned to each loop, both programmes always start simultaneously when either one or the other is run.

Up to 20 separate programmes using up to a maximum of 450 segments can be stored. The types of operational segment available are RAMP, DWELL and STEP. These segments may be entered in any order in a totally free format. Each programme has a special END segment which is used to terminate the programme in a controlled manner. Up to 10 programmes can allocated as sub-programmes, each consisting of RAMPS, DWELLS, STEPS etc., and can be called up to run as a segment of the main programme.

Up to 12 logic outputs can be set to change state at the start of each segment under programme control. This allows for switching of valves, switches, etc. There are 10 logic inputs available to allow external programme control.

A programme can be made to start from either the setpoint or process variable level. Holdback and overshoot facilities can be selected as required.

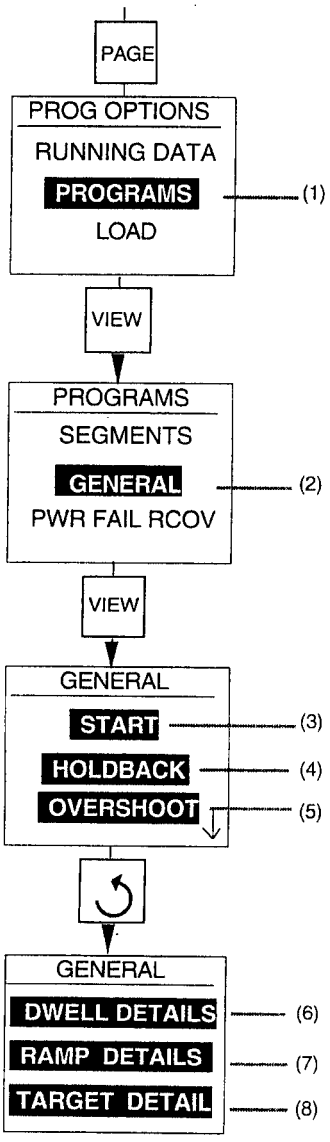
In the event of a power failure a series of recovery options are available for selection.

The operator interface has been divided into three levels. Levels 1 and 2 are set at the discretion of the Level 3 user. Level 3 has access to all programmer/controller functions and facilities, and decides the amount of access permitted to the Level 1 and Level 2 operators. Levels 2 and 3 are protected by individual security codes. The programmer/controller can be operated remotely via the communications link with computer supervisory control systems.

GENERAL DETAILS

Before creating a programme the following general details must be configured. If these details are ever changed then the segments of the affected programme should be checked as changing programme general details can change the segment data.

Setting General Details



To access any of the general details proceed as follows:

Repeatedly press the PAGE key until the PROG OPTIONS is displayed.

(1)Scroll to highlight PROGRAMS.

(2) Scroll to highlight GENERAL.

(3) See Start Level details on page 3.

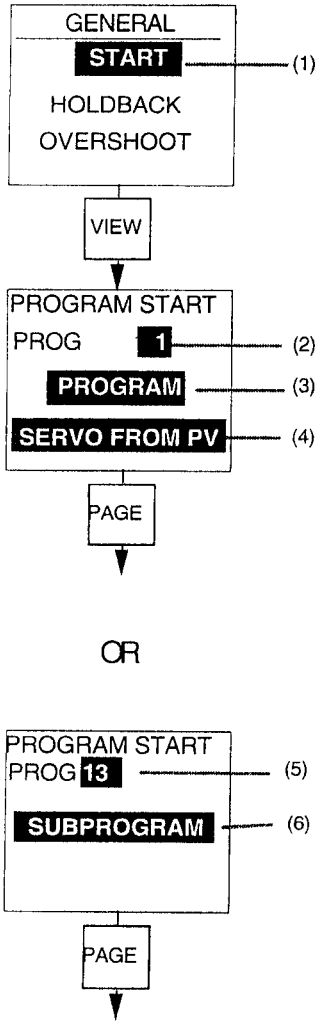
(4) See Holdback details on page 3.

(5) See Overshoot details on page 5.

(6) See Dwell Details on page 6.

(7) See Ramp Details on page 6.

(8) See Target Details on page 7.



Start Level

The initial programme setpoint can be made to start from a defined value before execution of the first segment of the programme. The setpoint can be made to track to the working setpoint or to the process value. Proceed as follows to action:

(1) Scroll to highlight START.

(2) Select the programme number by using the up/down keys.

(3) Select PROGRAM or SUBPROGRAM as required by using the scroll key to highlight and the up/down keys to select. Only programmes 11 to 20 can be selected as SUBPROGRAM and then only if subprogrammes have been configured, see chapter 4.

(4) Select SERVO FROM PV or SERVO FROM SP as required by using the scroll key to highlight and the up/down keys to select. The servo function is only applicable to PROGRAMS and is therefore removed for SUBPROGRAMS.

(5) As (2).

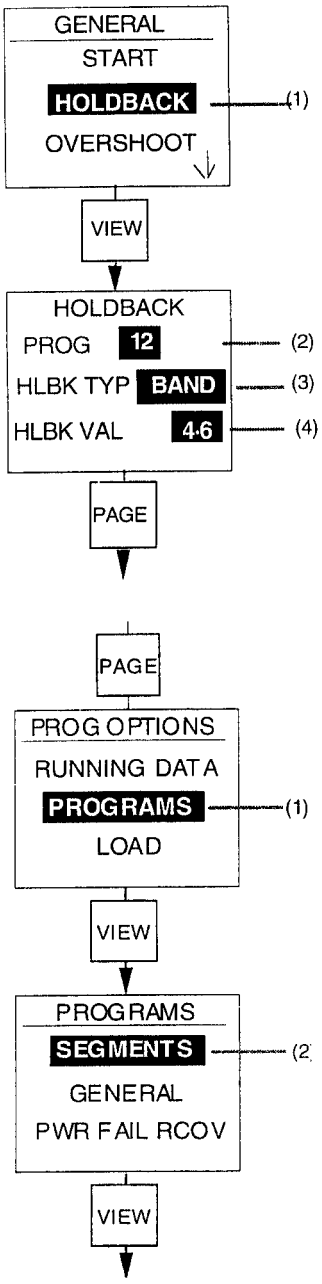
(6) As (3).

Holdback

Holdback is a feature that used to prevent the programme from modifying the setpoint if the process value, PV, and the setpoint differ by more than a specified value. The Holdback facility can be deconfigured, see chapter 4, and programmers are shipped with holdback deconfigured.
Holdback can be selected to be one of the following types:
Band Deviation- a symmetrical band around the setpoint of ±Holdback value.
When SP-PV>Holdback value or PV-SP>Holdback value, programme goes into Holdback.
High Deviation - a band above Setpoint of +ve Holdback value.
When PV-SP > Holdback value, programme goes into Holdback.
Low Deviation - a band below setpoint of -ve Holdback value.

When SP-PV > Holdback value, programme goes into Holdback.

Note: When two programmes are active and one enters Holdback the other will be placed into Holdback condition for the same period. HOLDBACK can be changed when the programme is running.



(1) Scroll to highlight HOLDBACK.

(2) Select programme number by using the up/down keys.

(3) Select required HOLDBACK type, BAND, HIGH, LOW or NONE.

(4) Set the Holdback value.

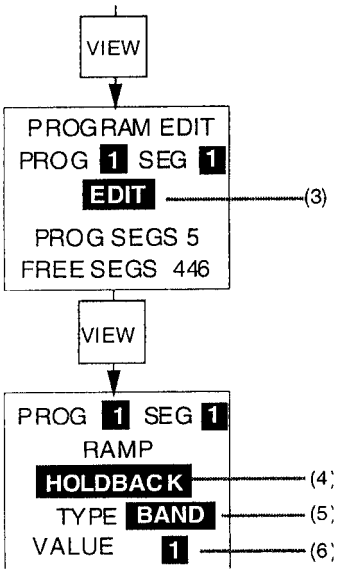
Holdback per Segment

Holdback can be configured to have a different type and/or value for each segment of the Programme. See chapter 5 for details of the configuration procedure. To operate holdback per segment, if configured, on switching on repeatedly press the PAGE key until the PROG OPTIONS page is displayed.

(1) Scroll to highlight PROGRAMS and press the VIEW key to access.

(2) Scroll to highlight SEGMENTS and press the VIEW key to select.

(3) Select EDIT from INSERT, EDIT and DELETE using the up/down keys.



(4) Select HOLDBACK from HOLDBACK, SEG DETAILS and DIGITAL OP using the up/down keys.

(5) Select the type of holdback from NONE, BAND, HIGH and LOW for the segment indicated.

(6) Select the size of holdback band in engineering units.

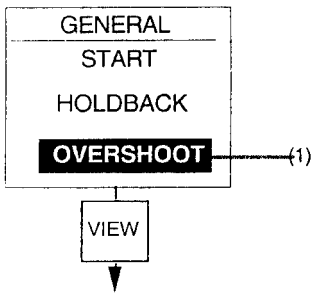
Overshoot

An overshoot inhibition is automatically provided for ramp and dwell starts to help reduce overshoot.

A value of between 0 and 1 can be set which determines the amount of overshoot of the process variable with respect to the setpoint. For no overshoot the optimum value of inhibition shouldl be 0.5.

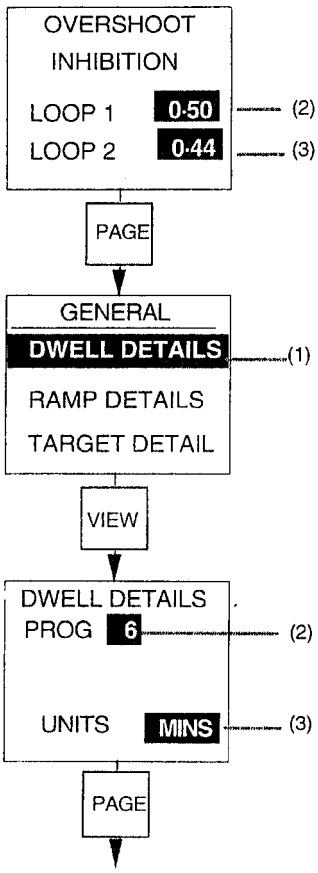
If the inhibition factor is too small the process variable will overshoot as the inhibition occurs too late. If the inhibition factor is too large it will also overshoot as the integral winds up.

For optimised conditions, set to 0.5 and run the process. If overshoot occurs increase the inhibition factor slightly above 0.5 check the overshoot. If greater than before reduce inhibition factor to just below 0.5. If less than before decrease the inhibition factor slightly.



(1) Scroll to highlight and press the VIEW key to access.

(2) Scroll to Loop 1 and set inhibition factor as necessary.



(3) Scroll to Loop 2 and set inhibition factor as necessary.

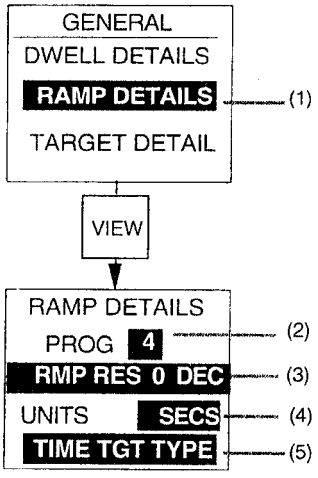
Dwell Details

Dwells can be set to be in hours, minutes or seconds.

(1) Scroll to highlight DWELL DETAILS and press VIEW to enter.

(2) Scroll to highlight and set required programme number with the up/down keys.

(3) Scroll to highlight and set required value of units from HOURS, MINS or SECS.



Ramp Details

Ramps can be set to ramp in units per hour, minute or seconds.

(1) Scroll to highlight and press VIEW to enter.

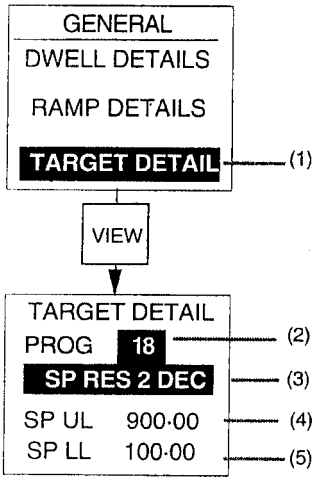
(2) Scroll to highlight and set required programme number with the up/down keys.

(3) Ramp rate resolution can be set up to 3 decimal places.

(4) Units can be set to HOURS, MINS or SECS.

(5) A ramp can be set to be either a time to target, TIME TGT TYPE, or a ramp rate, RMP RATE TYPE.

Target Details



(1) Scroll to highlight and press VIEW to enter.

Target setpoint resolution can be set, which may change the programmer setpoint limits as the instrument can only display five significant digits. E.g. 3 Decimal places means that the setpoint must lie between -99.999 and 99.999.

(2) Scroll to highlight and set required programme number with the up/down keys.

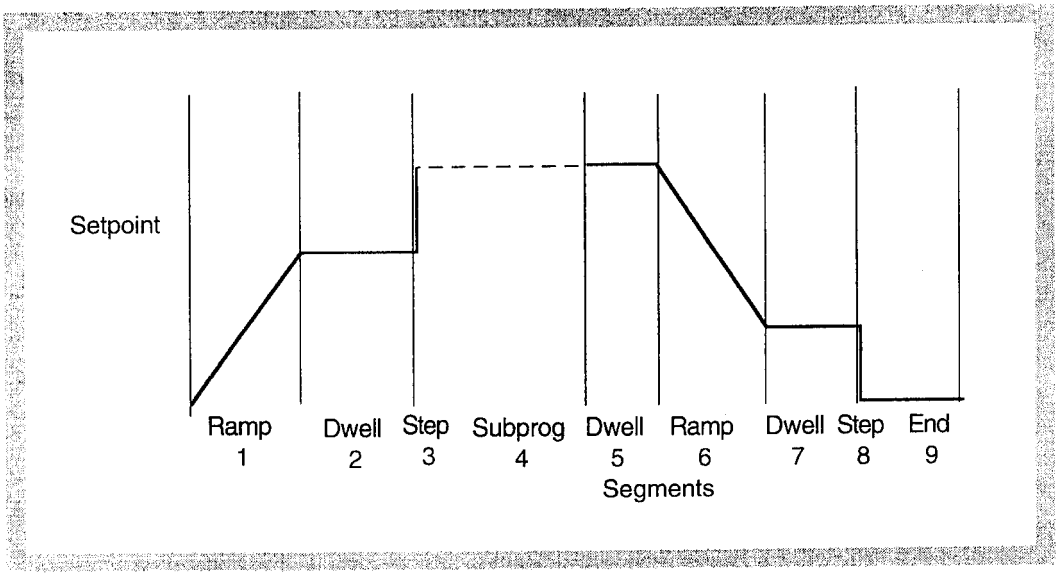
(3) Scroll to highlight and set resolution to 0, 1, 2 or 3 decimal places.

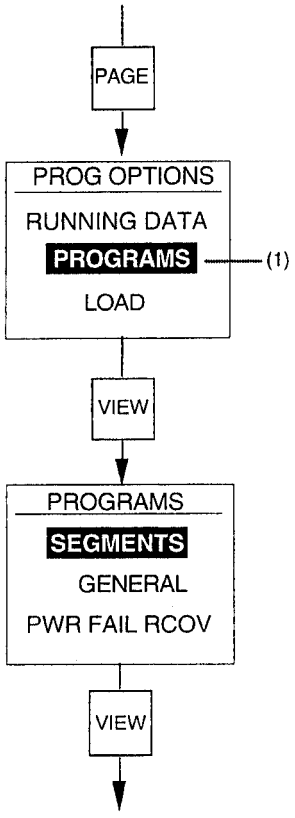
(4) Monitors Programmer Setpoint upper limit.

(5) Monitors Programmer Setpoint lower limit.

CREATING A PROGRAMME

To create a programme first draw out the versions of actions required. These can be any of the following; RAMPS, DWELLS, or STEPS. Each has to be allocated to a segment. E.g. The following programme has 9 segments.





Up to 12 Digital Outputs can be set to be actioned in each segment as required.
On switching on repeatedly press the PAGE key until the PROG OPTIONS page is displayed.

(1) Scroll to PROGRAMS and press the VIEW key to access.

As a programme consists of a number of segments which are allocated functions and their associated settings, scroll to SEGMENTS. Press the VIEW key to access.

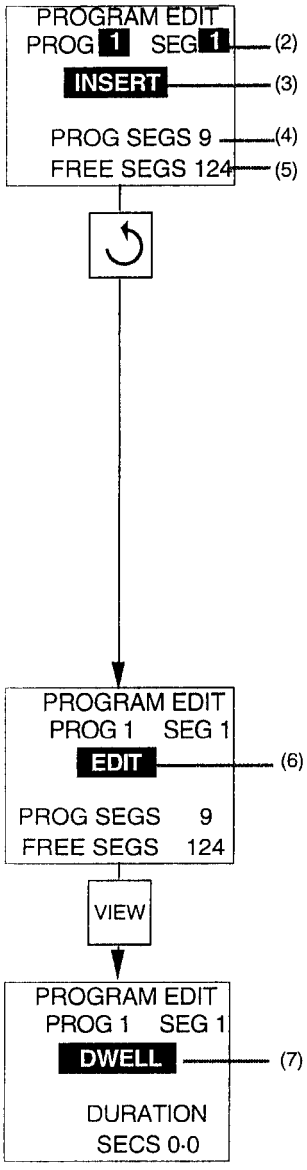
In the PROGRAM EDIT page SEGMENTS are:-

EDIT - choose whether a segment in the programme is a RAMP, DWELL, STEP or SUBPROG.

INSERT - add a segment to the programme

DELETE - remove a segment from the programme

DIG OPS - set-up the digital outputs in each segment in the programme; see para 6.0. DIG OPS will only appear if selected in configuration, see PRG DIG OP in Section 4.



Press the SCROLL key to highlight the required parameter.

(2) Set the required PROG number, 1 to 20, by means of the up/down keys.

(3) Select INSERT action from DELETE, INSERT, DIG OPS and EDIT by means of the up/down keys.

It is recommended to INSERT the total number of segments required at this stage.

(4) Press the VIEW key to set total number of segments required, each depression will cause the PROG SEGS number to increase by one.

(5) Indicates total number of free segments, FREE SEGS, remaining.

Note:- If unable to select INSERT, and only EDIT and DIG OPS are available, it means that the programme is loaded and therefore editing is inhibited.

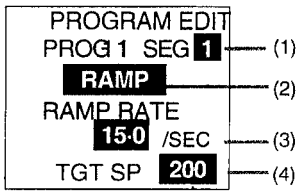
(6) It is now required to EDIT each segment, so select EDIT action from DELETE, INSERT, DIG OPS and EDIT, by pressing the up/down keys. Press the VIEW key to action once selected.

(7) When EDIT is actioned the function first displayed is always a DWELL, with a duration of zero time.

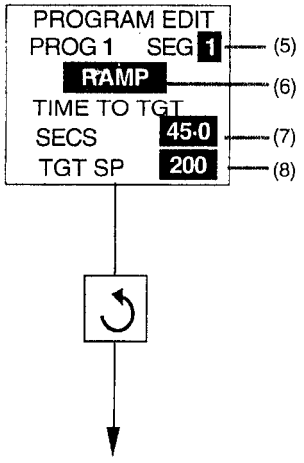
The following describes the actions taken to create the programme. Press the SCROLL key to access the functions and the up/down keys to select within the function.
Segment 1 from the example is to be a RAMP.

RAMP

A RAMP can be set to be either a RAMP RATE or a TIME TO TARGET. In both cases the ramp will continue at its current rate to the desired setpoint. See Programmer General Details, for selection.



OR



RAMP RATE

(1) Segment number allocated to be a RAMP.

(2) RAMP selected from RAMP, DWELL, STEP and SUBPROG. A SUBPROG will only be available if configured in chapter 4.

(3) Set required value of Ramp Rate. See RAMP DETAILS for selecting hours, minutes or seconds.

(4) Set target setpoint, TGT SP. The target setpoint is limited by the larger of the two loop setpoints.

or

TIME TO TARGET

(5) Segment number allocated to be a RAMP.

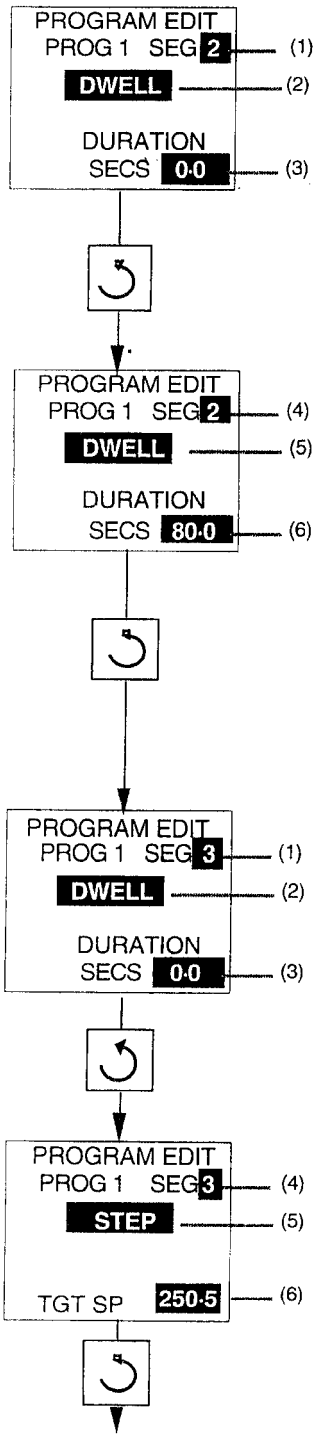
(6) RAMP selected from RAMP, DWELL, STEP and SUBPROG. A SUBPROG will only be available if configured in chapter 4.

(7) Set time to target. See RAMP DETAILS for selecting hours, minutes or seconds.

(8) Set target setpoint, TGT SP. The target setpoint is limited by the larger of the two loop setpoints.

Segment 1 is now set up for a RAMP.

Press the SCROLL key to highlight the SEG number and use the UP/DOWN keys to select the next segment.



Segment 2 from the example is to be a DWELL.

DWELL

(1) Set segment number to 2.

(2) DWELL is automatically defaulted and therefore does not have to be selected from RAMP, DWELL, STEP, SUBPROG.

(3) DURATION of DWELL is automatically defaulted to zero time.

(4) Segment number allocated to DWELL.

(5) DWELL selected from RAMP, DWELL, STEP, SUBPROG.

(6) DURATION of DWELL set to required time. See DWELL DETAILS for selecting units; hours, minutes or seconds.

Press the SCROLL key to highlight the SEG number and use the UP/DOWN keys to select the next segment.

Segment 3 from the example is to be a STEP.

STEP

(1) Set segment number to 3.

(2) DWELL is automatically defaulted from RAMP, DWELL, STEP, SUBPROG.

(3) DURATION time is zero.

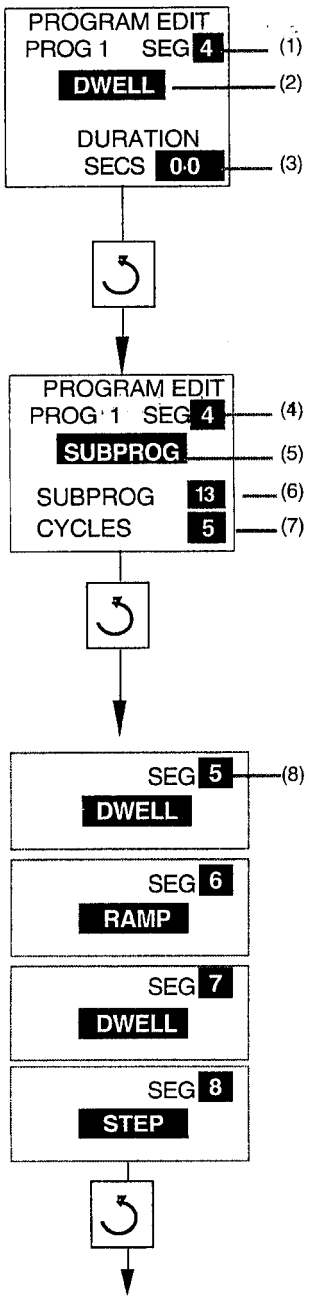
(4) Segment number allocated to STEP.

(5) STEP selected from RAMP, DWELL, STEP and SUBPROG.

(6) Set the target setpoint for the STEP.

Press the SCROLL key to highlight the SEG number and use the UP/DOWN keys to select the next segment.

Segment 4 from the example is to be a subprogramme.



SUB PROG

(1) Set segment number to 4.

(2) DWELL is automatically defaulted from RAMP, DWELL, STEP, SUBPROG.

(3) DURATION of DWELL is automatically defaulted to zero time.

(4) Segment number allocated to be a SUBPROG.

(5) Select SUBPROG from RAMP, DWELL, STEP and SUBPROG.

(6) Set subprogramme number.

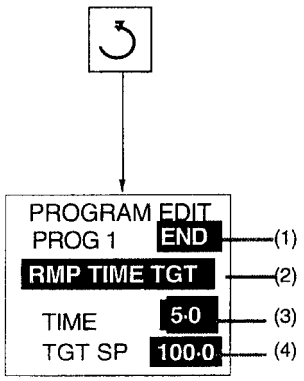
(7) Set how many times it is required to execute the subprogramme.

Note: Only programmes 1 to 10 can call subprogrammes and only programmes 11 to 20 can be subprogrammes.

(8) Continue to select each segment as required following the procedure as previously described. Select each segment in turn and allocate as required.

N.B. All RAMPS in a programme must be either ramp rate or time to target, but not a mixture.

END



(1) When all the segments selected have been allocated functions, e.g. 8 segments in the example, and 9 is entered as the last segment number it will automatically be replaced by END, indicating the end of the programme.

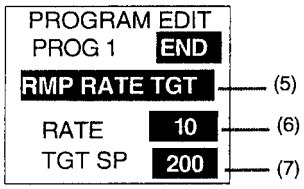
The last segment in a programme can be allocated to action one of the following:

(2) Programme ENDS with a ramp time to target, RMP TIME TGT.

(3) Time taken to reach target setpoint can be set. Units as per RAMP selected in programme.

(4) Set target setpoint as required.

OR



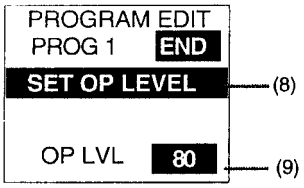
or

(5) Programme ENDS with a ramp rate to target.

(6) Set rate of ramp as required. Units as per RAMP selected in programme.

(7) Set target setpoint as required.

OR

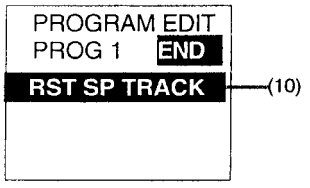


or

(8) When programme ENDS a specified output level is set and held until the programmer is reset.

(9) Set percentage of output level required.

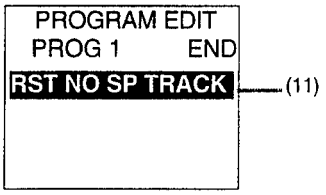
OR



or

(10) Programme ENDS by resetting the programmer and tracking the current programmer setpoint to the working setpoint, SP1, SP2 or the local SP trim of a remote SP.

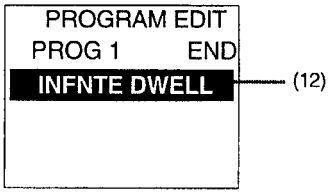
or



(11) Programme ENDS by resetting the programmer. The setpoint will then be the working setpoint current before the programme ran.

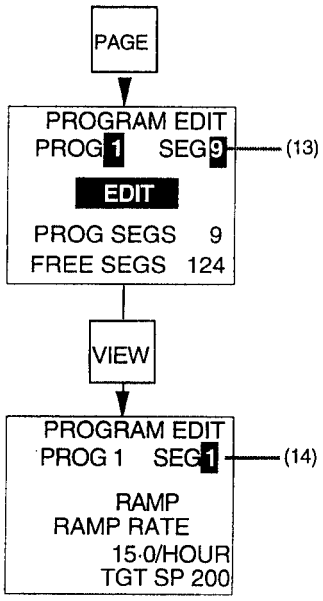
OR

or



(12) Programme ENDS with an indefinite dwell.

When all the segments have been set up for the programme they can be verified as follows:-



(13) When the END function has been selected press the PAGE key. Check correct programme number is selected. Scroll to highlight the segment number and use the down key to select SEG 1. Press the SCROLL key to highlight EDIT and press the VIEW to access.

(14) Segment 1 contents will now be displayed, e.g. SEG 1 is a RAMP.

To check the remaining segments repeatedly press the up key to select each segment number and display the relevant segment contents.

ALTERING A PROGRAMME

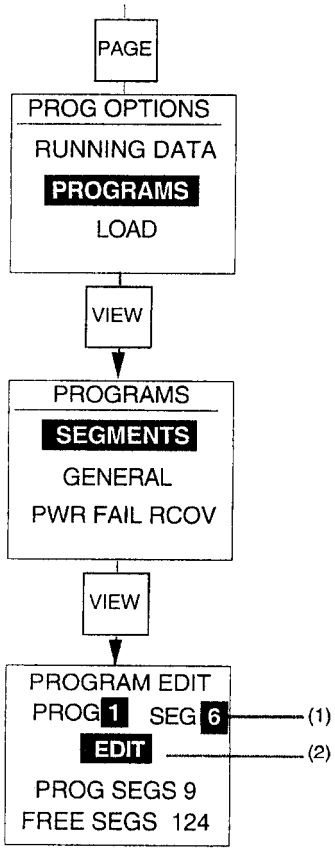
Once a sequence of segments has been set up and allocated to a programme modifications can be carried out as follows:-

a) Change an existing segment

b) Insert a new segment

c) Delete an existing segment

Change an Existing Segment



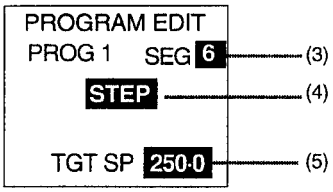
Repeatedly press the PAGE key until the PROG OPTIONS page is displayed.

Scroll to PROGRAMS and press the VIEW key to access.

Scroll to SEGMENTS and press the VIEW key to access.

(1) Select the PROG number and the segment number that is to be modified, by means of the up/down keys.

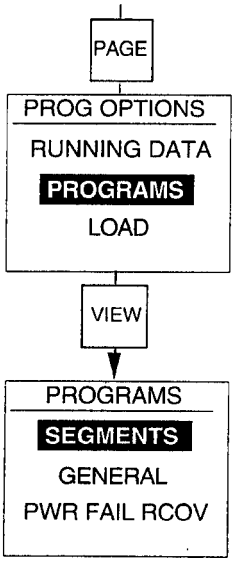
(2) Select EDIT and press the VIEW to access.



(3) Segment number selected.

(4) The existing segment will be displayed. Both the segment type and any associated values can be changed.E.g. If it is required to change the STEP for some other segment type, scroll to highlight STEP and select by means of the up/down keys from RAMP, DWELL, SUBPROG.

(5) In the example shown, segment 3 was a STEP therefore the parameter associated with that STEP will be displayed. To change a parameter value, scroll to highlight and change by means of the up/down keys.



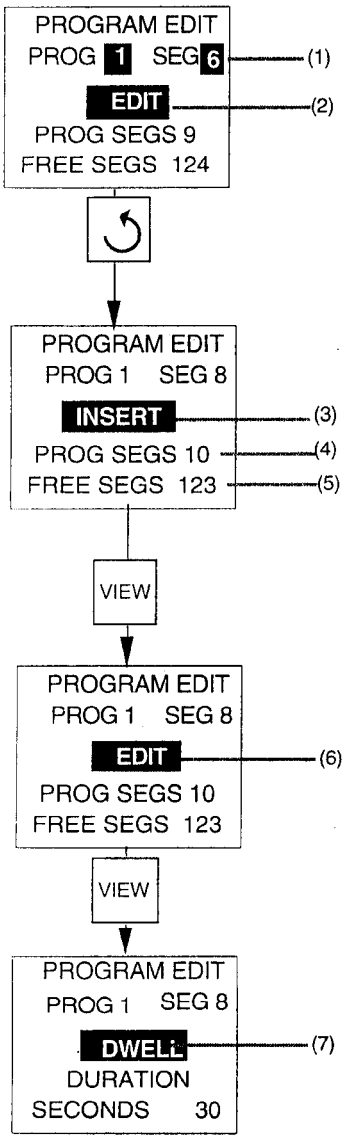
Inserting a Segment

To insert a new segment in an existing programme proceed as follows:-

Repeatedly press the PAGE key until the PROG OPTIONS page is displayed.

Scroll to PROGRAMS and press the VIEW key to access.

Scroll to SEGMENTS and press the VIEW key to access.



(1) Select the required programme, PROG, by setting the number using the up/down keys.

Select the segment number, SEG, where it is required to insert the new segment; i.e. if it is required to insert a RAMP in segment 8, select SEG 8, using the up/down keys.

Note: Select the segment before which the new segment is to be inserted. The existing segment 8 will now be forced into segment 9 and so on moving all the remaining segments up by one.

(2) Press the SCROLL key to access.

(3) Scroll to select INSERT from EDIT, DELETE, INSERT, DIG OPS. then press the VIEW key.

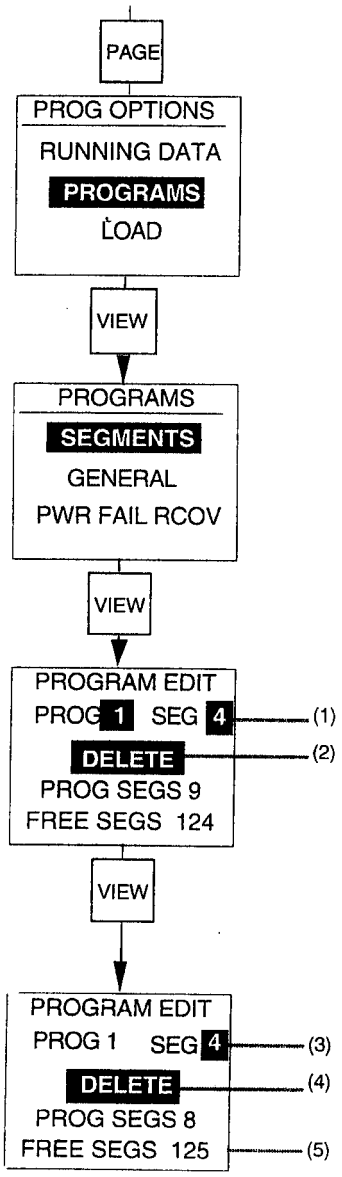
(4) The total number of PROG SEGS will increase by one, as you have now added a segment.

(5) The total FREE SEGS will decrease by one.

(6) Scroll to highlight and to select EDIT from INSERT, DELETE, EDIT, DIG OPS. and press the VIEW key to access.

(7) A new segment is automatically defaulted to be a DWELL with a duration of zero time.
To select the required parameter scroll through, using the up/down keys to select a RAMP, DWELL, STEP or SUBPROG.

Once selected scroll through setting the parameter values as required.



Deleting a Segment

To delete a segment from an existing programme proceed as follows:-

Repeatedly press the PAGE key until the PROG OPTIONS page is displayed.

Scoll to access PROGRAMS and press the VIEW key.

Scroll to access SEGMENTS and press the VIEW key.

(1) Select the required programme, PROG, by setting the number using the up/down keys. Select the segment number, SEG number that is to be deleted.

(2) Scroll to select DELETE from EDIT, DELETE, INSERT, DIG OPS and press the VIEW key.

(3) The original segment 4 has been deleted and replaced by segment 5.

(4) The total number of segments , in the programme, PROG SEGS, has decreased by one, from 9 to 8.

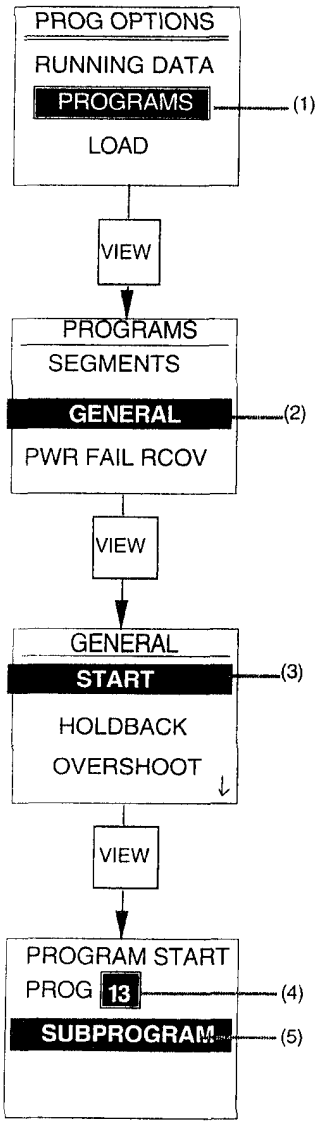
(5) The total number of FREE SEGS has increased by one, from 124 to 125.

SUBPROGRAMMES

A maximum of 20 programmes are available in the instrument and up to 10 of these programmes can be allocated as subprogrammes. A subprogramme can be any programme number from 11 to 20. A subprogramme is called by the current programme, in the range 1 to 10, for execution.

A subprogramme cannot call a subprogramme but may be executed more than once. A subprogramme must be designated and created before the main programme that uses it can be loaded.

The subprogramme facility has to be configured, see chapter 4. The instrument is shipped with the subprogrammes not configured.



Designating a Subprogramme

To designate a subprogramme repeatedly press the PAGE key until the PROG OPTIONS page is displayed.

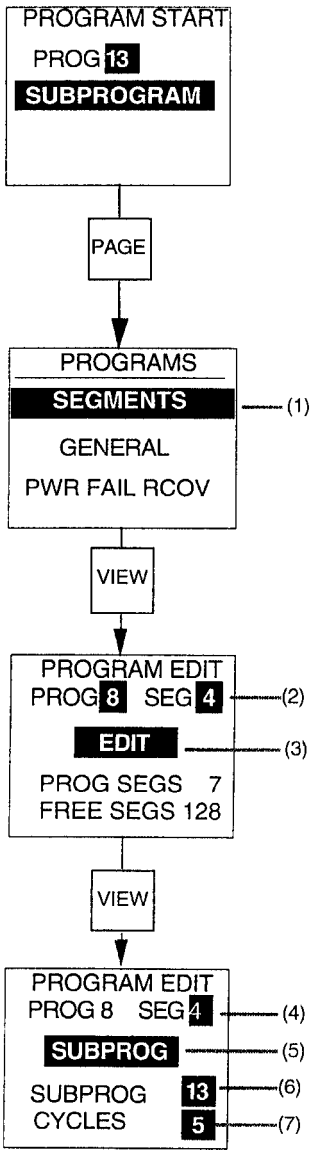
(1) Scroll to PROGRAMS and press the VIEW key to access.

(2) Scroll to GENERAL and press the VIEW key to access.

(3) Scroll to START and press the VIEW key to access.

(4) Select a programme number between 11 and 20 for allocation to the subprogramme.

(5) Scroll to highlight and select SUBPROGRAM from SUBPROGRAM and PROGRAM using the up/down keys.



Allocating a Subprogramme

To allocate this subprogramme to a main programme press the PAGE key and proceed as follows:

(1) Scroll to highlight SEGMENTS.

(2) Select the required main programme and select the segment number where the subprogramme is to be located.

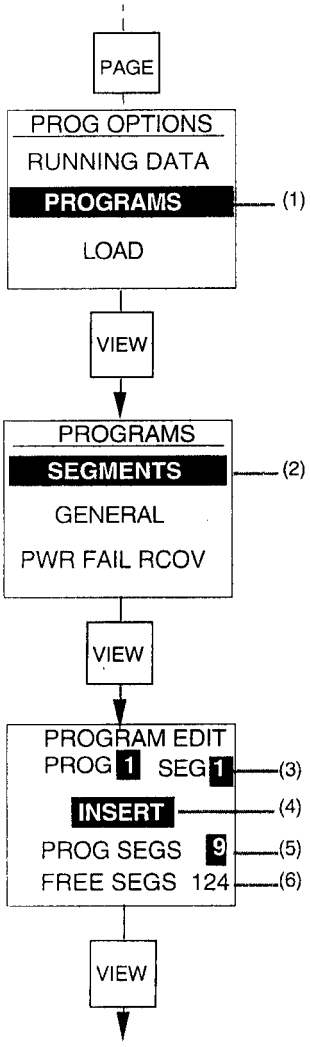
(3) Select EDIT action from DELETE, INSERT, DI OPS, EDIT and press VIEW key.

(4) Check the SEG number.

(5) Select SUBPROG from RAMP, DWELL, STEP and SUBPROG by means of the up/down keys.

(6) Set the designated subprogramme number.

(7) Set how many times the subprogramme is required to execute.



Creating a Subprogramme

To create a subprogramme proceed as follows:-

On switching on repeatedly press the PAGE key until the PROG OPTIONS page is displayed.

(1) Scroll to PROGRAMS and press the VIEW key to access.

(2) As each individual parameter of a programme has to be allocated to a segment scroll to SEGMENTS.

Press the VIEW key to access.

(3) Set the PROG number, 11 to 20, by means of the up/down keys.

Set the first SEGMENT number by means of the up/down keys.

(4) Select INSERT action from DELETE, INSERT, DIGITAL OPS and EDIT by means of the up/down keys.

(5) Press VIEW key to set total number of segments required in this subprogramme.

(6) Indicates total number of free segments remaining.

Proceed to create a subprogramme exactly as for a main programme as described on page 8-8.

DIGITAL OUTPUTS

Up to 12 digital outputs are provided which can be controlled by programmes in either or both loops. These digital outputs can be set in each segment of a programme and are updated, when a programme is running, at the start of each segment.

Instruments are shipped with the digital outputs deconfigured. Digital outputs will only be available if they are configured, see chapter 4.

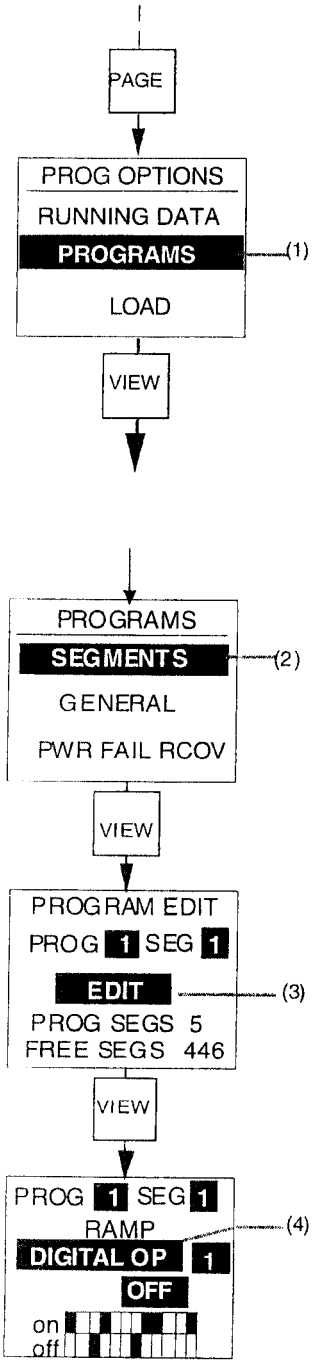
As each loop can affect the digital outputs it is sometimes useful to allocate digital outputs 1 to 6 to say loop 1 and digital outputs 7 to 12 to loop 2. Alternatively the programme on loop 1 could set DIG OP 1 to ON and the programme on loop 2 could set it OFF later - in other words programmes on both loops could change the same digital output. When one loop tries to set a digital output ON and the other OFF, the state demanded by the programme on loop 2 wins.

The digital outputs can be selected to be ON, OFF or UNCHANGED for any segment. When the programme is running UNCHANGED digital outputs take the state they had before the segment runs, except when the programme starts when UNCHANGED segments are set to OFF. This feature is useful when allocating half the digital outputs to each loop as described above, when loop1 would always leave digital outputs 7 to 12 unchanged.

The state of digital outputs can be monitored when the programme is running as described later in para 9.0 and when the programmer is placed in HOLD the state of the digital outputs can be changed..

The digital outputs must be allocated functions and slot locations in the configuration of the instrument if they are to drive relays, switches and so on, see chapter 4.

The digital outputs can be useful even when not configured to outputs to show the synchronisation between programmes on both loops of a dual loop instrument.



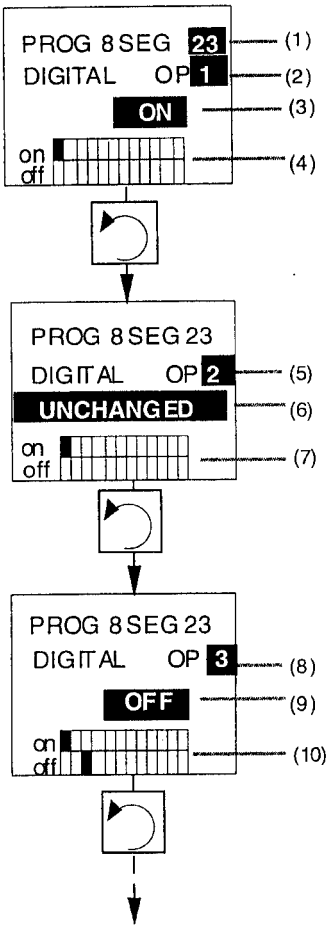
On switching on repeatedly press PAGE key until the PROG OPTIONS page is displayed.

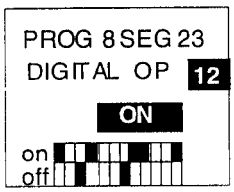
(1) Scroll to highlight PROGRAMS and press the VIEW key to access

(2) Scroll to highlight SEGMENTS and press the VIEW key to select.

(3) Select EDIT from INSERT, DELETE, EDIT using the up/down keys.

(4) Select DIGITAL OP from HOLDBACK, SEG DETAILS and DIGITAL OP and using the up/down keys.





(1) Segment 23 selected of programme number 8

(2) Scroll to highlight the digital output number. Selection is by means of the up/down keys.

(3) Scroll to highlight the digital output. The selected Digital output can be selected to be OFF, ON or UNCHANGED using the up/down keys.
E.g. ON, the corresponding portion of the 'on' row will be filled.

(4) Confirms that Digital output 1 is selected on.

(5) Scroll to highlight the next Digital output, e.g. 2.

(6) The selected Digital output can be selected to be ON, OFF or UNCHANGED. E.g. UNCHANGED selected, the corresponding 'on' and 'off' rows will be unfilled.

(7) Confirms that Digital output 2 is selected unchanged.

(8) Scroll to highlight the next Digital output, e.g. 3.

(9) The selected Digital output can be selected to be ON, OFF or UNCHANGED E.g. OFF selected, the corresponding 'off' row will be filled.

(10)Confirms that Digital output 3 is selected off.

Proceed as previously described by scrolling and setting all 12 Digital outputs as required.
In the example shown, the Digital Outputs in this segment have been set as follows:

DIGITAL OP	1	ON
DIGITAL OP	2	UNCHANGED
DIGITAL OP	3	OFF
DIGITAL OP	4	ON
DIGITAL OP	5	UNCHANGED
DIGITAL OP	6	UNCHANGED
DIGITAL OP	7	OFF
DIGITAL OP	8	ON
DIGITAL OP	9	ON
DIGITAL OP	10	UNCHANGED
DIGITAL OP	11	UNCHANGED
DIGITAL OP	12	ON

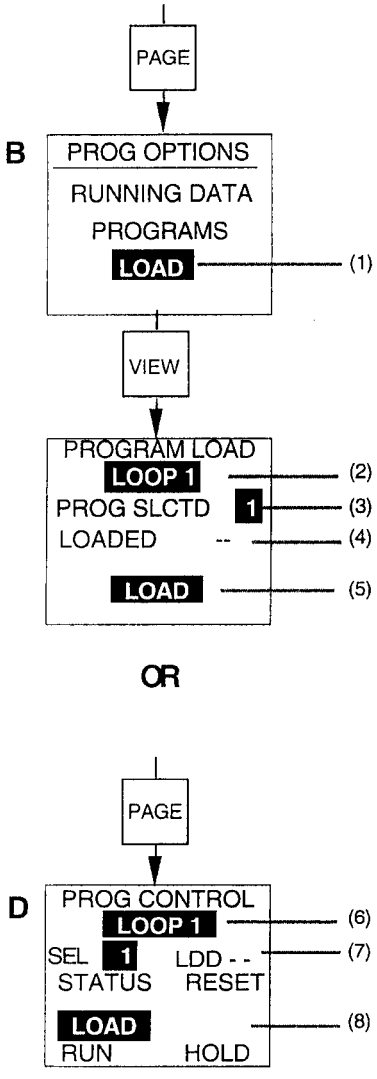
ON  OFF  UNCHANGED 

This is how the above set of Digital outputs are displayed in SEG 23 of Programme 8.

LOADING A PROGRAMME

Once a programme has been created it has to be loaded. A programme can be loaded from either the PROG OPTIONS page B or the PROG CONTROL page D. Which of the pages are available will depend upon the allocation made in Levels of Operation.

To load a programme into a single loop or into either loop 1 or loop 2 of a dual loop programmer switch the instrument on and press the PAGE key until one of the following pages is displayed:-



Loading a Programme

(1) Scroll to highlight LOAD and press the VIEW key to access.

(2) Select loop 1 or 2 as required.

(3) Select programme number using the up/down keys.

(4) Will automatically indicate programme number loaded when (4) actioned. LOADED- - indicates a null, nothing selected.

(5) Scroll to highlight LOAD and press the VIEW key to load. Selected programme is shown as loaded when the programme number is displayed in (4). If the programme does not load an ERROR message may be displayed, see Error messages overleaf.

(5) It may take several seconds to load a long programme containing several subprogramme calls. ***LOADING*** flashes on the display while programme is being loaded.

(6) Select loop 1 or 2 as required.

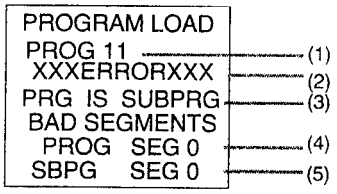
(7) Select programme number using up/down keys. LDD will automatically indicate programme number loaded when (8) is actioned. LDD - - indicates a null, nothing selected.

(8) Scroll to highlight LOAD and press the VIEW key to load. Selected programme is shown as loaded when number is displayed against LDD in item (7). If the programme does not load the number displayed against LDD will not alter.

Note: A long programme may take several seconds to load.

Error Messages

Note: Main programmes can be numbered 1 to 20. Subprogrammes can be numbered 11 to 20. A main programme numbered 1 to 10 only can call up subprogrammes.



(1) Indicates programme number

(2) When a programme fails to load ERROR is displayed.

(3) Error message pertaining to one of the following listed below.

(4) Programme segment where the error was found

(5) Subprogramme segment where the error was found.

PRG IS SUBPRG - This is a subprogramme and cannot be loaded. It must be called up by a main programme.

NO PROGRAM - A programme has been selected which contains no segments.

NO SUBPRG - Tried to call a subprogramme that does not exist

SUBPRG IS PRG - A programme designated to be a subprogramme is configured as a programme and so prevents the selected programme from being loaded.

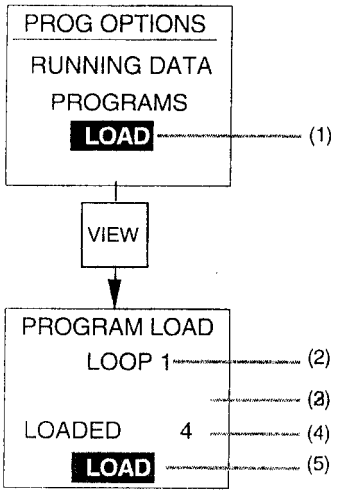
TGT SP TOO HI -
TGH SP TOO LO -
END SP TOO HI -
END SP TOO LO-
Any of these errors will be displayed if any setpoints allocated in the setting up of the segments are outside the range limits of the selected loop.

INCOMP ENDS - Displayed when two programmes have END segments that are incompatible. Most combinations are acceptable but if one programme has a reset END function the other must have the same.

PRG NOT RESET - Displayed when attempting to load a new programme when the programmer is not RESET.

NOT PID NO OP- Cannot load an END which sets the output power unless the control definition for the loop is PID.

OP PWR TOO HI-
OP PWR TOO LO-
Output power specified in the END segment is outside the power limits for the selected loop.



Unloading a Programme

Press the PAGE key to display the following:-

(1) Scroll to highlight LOAD and press the VIEW key to access.

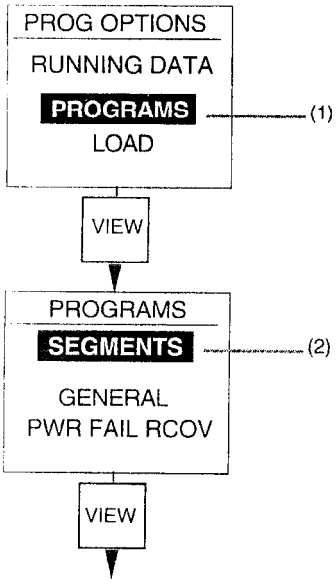
(2) Select the loop the programme is in that is required to be unloaded using the up/down keys.

(3) Using the up/down keys set the PROG SLCTD to indicate - - (This precedes 1 or succeeds 20)

(4) Will indicate the programme number loaded.

(5) Scroll to highlight LOAD and press the VIEW key. The loaded programme number in (3) will now indicate - -

Note: Programmes can only be unloaded when the programmer is RESET.



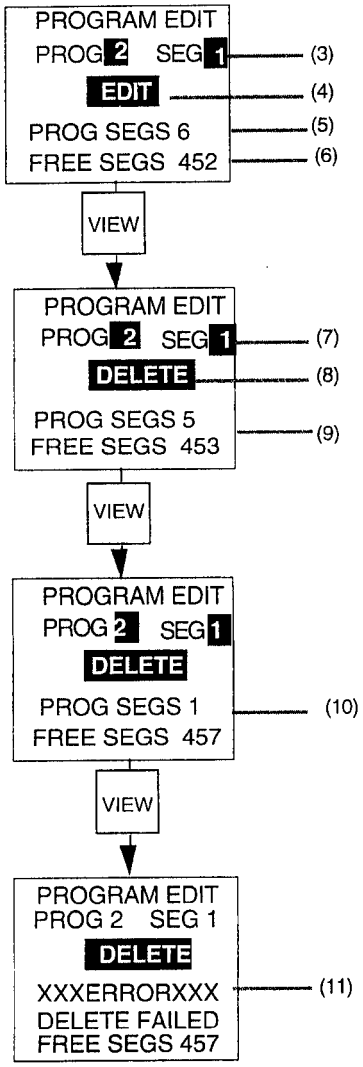
Deleting a Programme

A programme can only be deleted segment by segment. Start by selecting and deleting the first segment in the programme. Segment 2 now becomes segment 1, segment 3 becomes segment 2, segment 4 becomes segment 3 and so on. As each new segment 1 is deleted the segments decrease until all are deleted.

Press the PAGE key to display the PROG OPTIONS page:-

(1) Scroll to highlight PROGRAMS and press the VIEW key.

(2) Scroll to highlight SEGMENT and press the VIEW key.



(3) Select the programme number that is required to be deleted then scroll to the SEG number. Use the up/down keys to select SEG 1. Press the SCROLL key.

(4) When highlighted press the up/down keys to select DELETE and press the VIEW key. The original segment number 1 has now been deleted and segment 2 now becomes segment 1.

(5) Once a segment has been deleted the total segments in the programme, PROG SEGS, decreases by one.

(6) As a segment is deleted the total number of FREE SEGS increases by one.

(7) Indicating segment 1.

(8) When DELETE is highlighted repeated pressing of the VIEW key will cause a segment to be deleted for each depression.

(9) Indicates the total number of segments in the programme and the total number of free segments left.

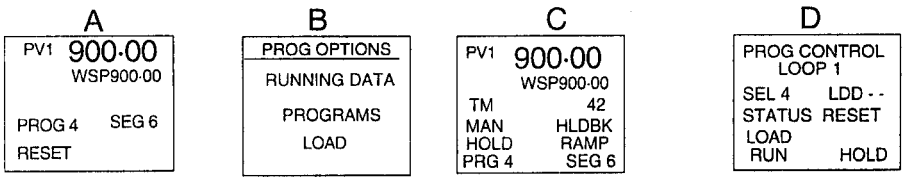
(10) When a programme reaches the last segment it cannot be deleted as it is the END segment and all programmes are allocated with an END segment on initialisation. So now the programme is considered to be deleted.

(11) If attempts are made to delete the last segment the error message shown will be displayed, failed to delete segment, FLD DLETE SGT.

OPERATING A PROGRAMME

An operator can control and action programmes via the six front panel keys or digital inputs or the communications link. The following describes operating programmes from the front panel keys.

Functions availablewill be dependent upon which programme display pages have been made available to the operator.

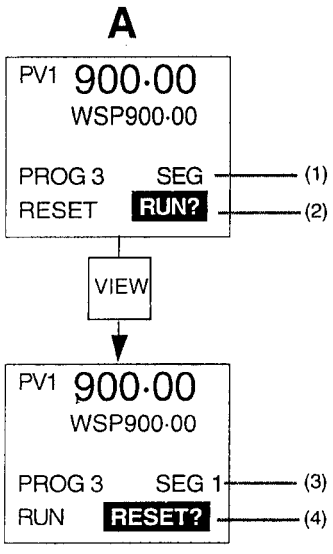


The above display pages are used to load, operate and monitor programmes. Which of these displays are made available to the operator is determined by the supervisor.

Programmes can be RUN and a stop placed on a programme at any time by putting it into a HOLD or RESET as and when required. Programmes can be made to repeat a number of times, which is called CYCLING. A FAST RUN facility enables an operator to inspect a programme, segment by segment, without having to run the programme. Up to 12 digital outputs are provided which can be set and controlled in each segment of a programme.

Note: On dual loop instruments two programmes can be used at the same time. Whenever an action is placed on one programme it will also affect the other in the same way; i.e. a RUN, HOLD or RESET placed on one programme will cause the same affect on the other.

Run a Programme



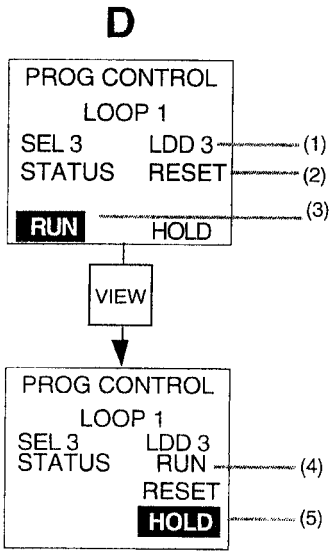
A programme can be RUN from either the display page A or the PROG CONTROL page D. Which of these pages is available depends on the selected levels of operation. Display page A.

(1) Displays loaded programme number.

(2) The left hand parameter, in this example, RESET, indicates the current state of the programme. The highlighted parameter RUN can be selected by pressing the VIEW key. If HOLD or RESET is highlighted press the up or down key to select RUN.

(3) Displays programme number and segment number being actioned.

(4) The programme is now running, the status RUN being displayed bottom left.



Display page D

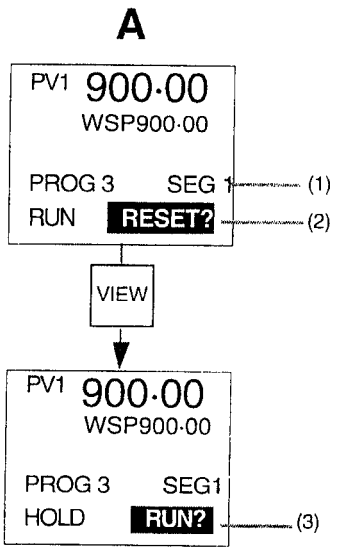
(1) Programme number selected and loaded.

(2) Current status of programme.

(3) Press the SCROLL key, when RUN is highlighted press the VIEW key.

(4) Indicates current status of programme now running, by indicating RUN.

(5) The LOAD and RUN options disappear, and the RESET reverts to its non-operative position.



Hold a Programme

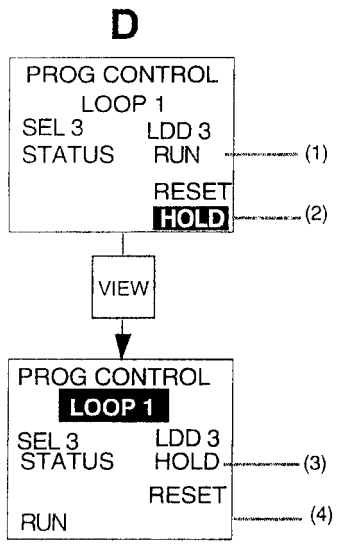
A HOLD can be placed on a programme at anytime. A HOLD can be put on a programme from either the display page A or the PROG CONTROL page D.

Display page A

(1) Segment 1 of programme number 3 is running

(2) When highlighted press an up or down key to select HOLD? Press VIEW key to action.

(3) The bottom left parameter, indicates that a HOLD has been placed on the programme.



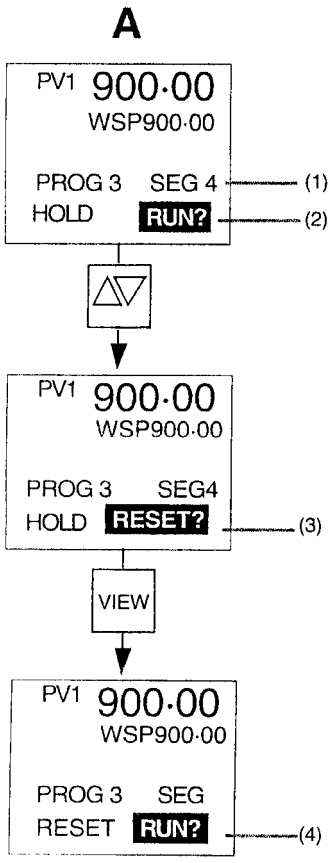
Display page D

(1) Current status of programmer is shown as running.

(2) Scroll to highlight HOLD and press the VIEW key to action.

(3) Indicates programmer is now in a HOLD state.

(4) The HOLD option disappears and the RUN option reverts to its non-operative position.



Reset a Programme

The programme can be RESET at anytime.

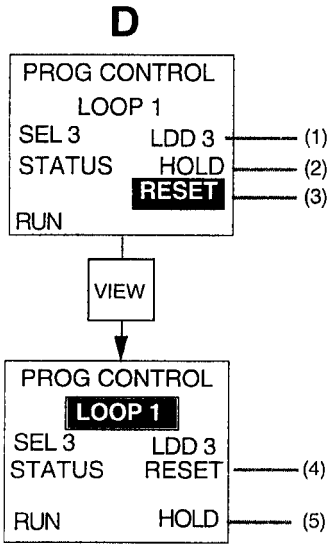
A programme can be RESET from either the display page A or the PROG CONTROL page D.
Display page A

(1) Segment 4 of programme number 3 is being actioned.

(2) Indicates programme in a HOLD. With RUN? highlighted press an up or down key to select RESET?

(3) Indicates programme still in a HOLD with RESET? highlighted. Press the VIEW key to select RESET.

(4) Bottom left hand parameter indicates that programme number 3 has been RESET.



Display page D

(1) Programme number 3 selected.

(2) Current programme number is in a HOLD.

(3) Scroll to highlight RESET and press the VIEW key to action.

(4) Indicates that programme number 3 has been RESET.

(5) The RESET option disappears and the RUN and HOLD options revert to their non-operative positions.

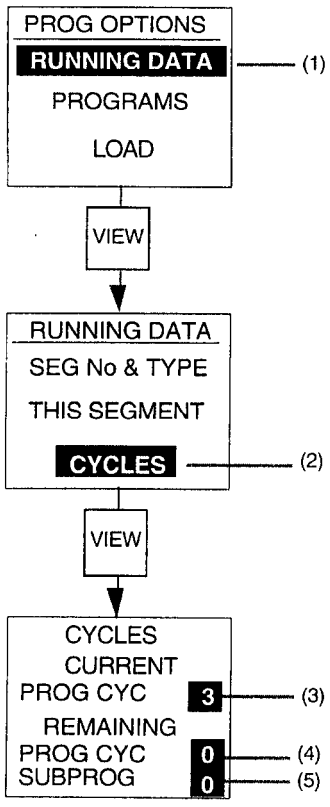
Cycling the Programmer

To cycle a programme it must be loaded and be RESET.

When a programme has been set to cycle a number of times it will run to the segment before the END segment and restart at segment 1. Only when it has completed all the cycles will it enter the END segment and finish. A programme can be cycled up to 9998 times. If set to 9999 the programme will cycle indefinitely.

If programmes are being run in both loops and one programme is cycled the other will automatically be cycled the same number of times. At the end of each cycle the shorter programme will wait for the longer programme to finish before both start the next cycle.

A programme can only be cycled from the PROG OPTIONS display page B.



(1) Scroll to highlight and press the VIEW key

(2) Scroll to highlight and press the VIEW key

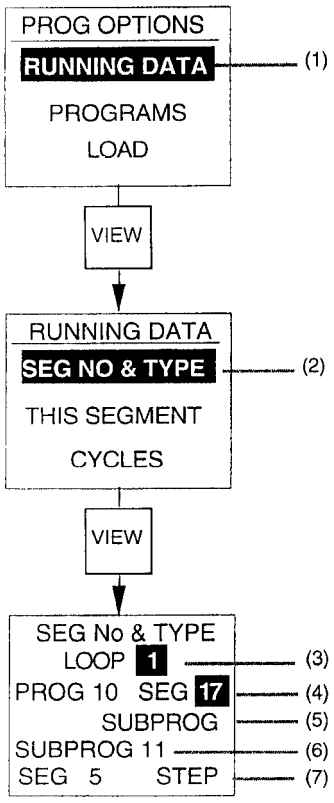
(3) Scroll to highlight and set the number of cycles required.

(4) Indicates the number of cycles left to run.

(5) As for (4) but refers to any SUBPROG that may be called up to run a certain number of times.

Fast Run a Programme

The 'FAST RUN' facility allows the operation of a programme to be inspected segment by segment without having to run the programme. The FAST RUN facility can be configured to work with the live process and digital outputs or when the instrument is placed in the standby mode, when the process and digital outputs are not driven. The FAST RUN can be configured to be unavailable, see chapter 2.
Note that if FAST RUN is configured to work in standby the instrument must also be placed into a STANDBY mode, see chapter 4.
To use the FAST RUN facility, place the programmer in HOLD and configure the instrument for STANDBY operation in chapter 4.
It is now possible to step forwards and backwards through the programme loaded using the SEG NO & TYPE function of the PROG OPTIONS page, page B.



(1) Scroll to highlight, press the VIEW key .

(2) Scroll to highlight, press the VIEW key.

(3) Select the loop that the programme is loaded into if a dual loop instrument.

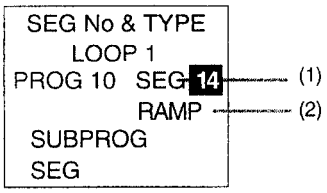
(4) Scroll to the SEG number. The programme can now be FAST RUN by scrolling through the segment numbers using the up/down keys. As each segment number is selected so the parameter associated with that segment is displayed, RAMP, DWELL etc.

The programme can be RUN from any of the segments selected by removing the HOLD when in that segment.

(5) Indicates segment type of the main programme is a SUBPROG.

(6) Indicates that SUBPROG 11 has been called up by the main programme.

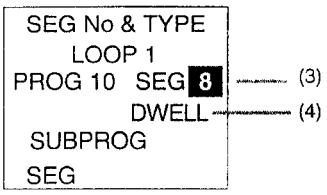
(7) Segment number and type are indicated when a SUBPROGRAM is called up and run by the main programme.



The programme can be continued to be RUN from any of the segments in the programme.
E.g. The programme number 10 is running in segment 14 and it is required to stop it and go back to RUN the programme from segment 8.
Go to Display A or D and place a HOLD on programme 10. PAGE to the PROG OPTIONS page and enter the RUNNING DATA.

(1) Scroll to highlight SEG and select segment 8 using the down key.

(2) Indicates parameter of segment 14 is a RAMP



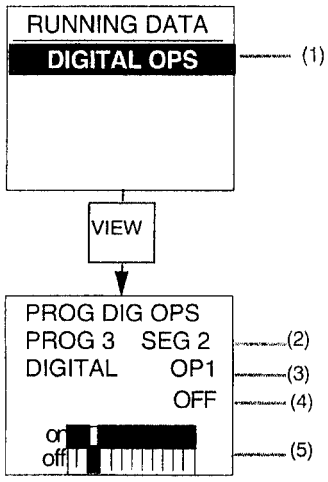
(3) Segment 8 selected.

(4) Indicates function of segment 8 is a DWELL.

Press the PAGE key to Display page A or D and select programme 10 to RUN. The programme will now continue from segment 8.

Digital Outputs

The state of each of the 12 digital outputs can be set to be ON or OFF when the programmer is in HOLD.



(1) Enter RUNNING DATA and continue scrolling until DIGITAL OPS is displayed. Press the VIEW key to access.

(2) Indicates current programme and segment number.

(3) Digital outputs 1 to 12. Select by using the up/down keys where highlighted.

(4) Digital output selected ON or OFF by the up/down keys.

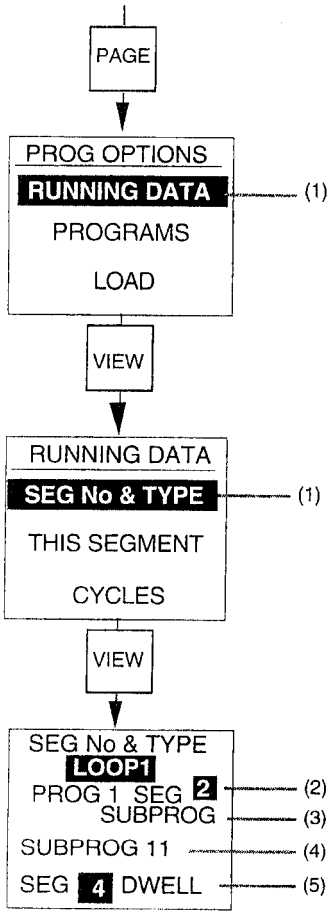
(5) For each digital output selected ON the 'on' or upper portion of the table will fill. For each digital output selected off, the 'off' or lower portion of the table will fill.

MONITORING A PROGRAMME

General

Programme monitoring provides facilities which allows running programmes to be monitored, segment by segment.

The states of the 12 digital outputs in each segment can be accessed and changed as required.



Current Information

Proceed as follows to access the current information of a programme:-
On switching on repeatedly press the PAGE key until either Display A or D is displayed.
Press the PAGE key until the PROG OPTIONS page is displayed.

(1) Scroll to highlight and press VIEW key to access.

Segment Number and Type

This facility enables the state of a programme to monitored at anytime. It indicates the current programme and segment numbers being actioned. Any subprogrammes called up by a main programme are treated in a similar manner.

(1) Scroll to highlight and press the VIEW key to access.

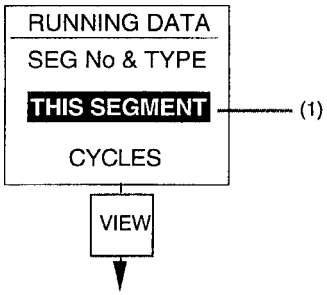
(2) Indicates the current segment of the of the selected programme.

(3) Indicates the segment type of the current segment .

(4) Indicates running subprogramme number if any.

(5) Indicates segment type of the subprogramme if any.

Current Segment Information

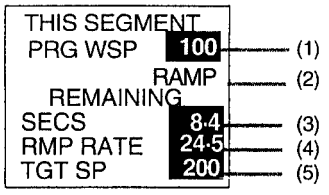


The 'THIS SEGMENT' page provides all the relevant information of the current segment being run by a programme. Changes can be carried out by placing the programmer into HOLD.
When a SUBPROGRAM is being called by the main programme the segment details displayed are for the current segment of the SUBPROGRAM and can be altered exactly as for the main programme.

(1) Scroll to highlight and press the VIEW key to access.

To alter any of the values whilst the programme is in HOLD scroll to the respective value and when highlighted change by using the up/down keys.

RAMP Information



(1) Indicates the programme working setpoint, which can be altered.

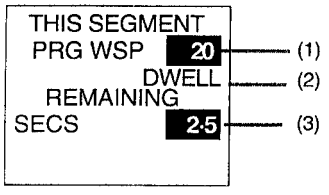
(2) Displays the type of segment

(3) Gives the time remaining of the RAMP, which can be altered.

(4) The current ramp rate, which can be altered in HOLD if the RAMP is a RAMP RATE type.

(5) The target setpoint, which can be altered.

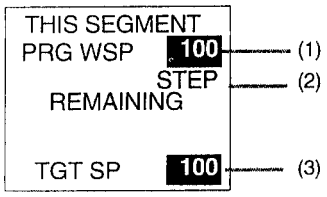
DWELL Information



(1) Indicates the programme working setpoint, which can be altered.

(2) Displays the type of segment

(3) Indicates the time remaining of the DWELL, which can be altered.

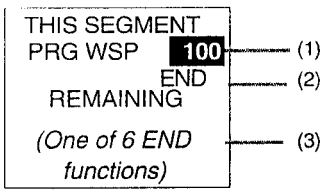


STEP Information

(1) Indicates the programme working setpoint, which can be altered.

(2) Displays the type of segment.

(3) Indicates the target setpoint, which can be altered.

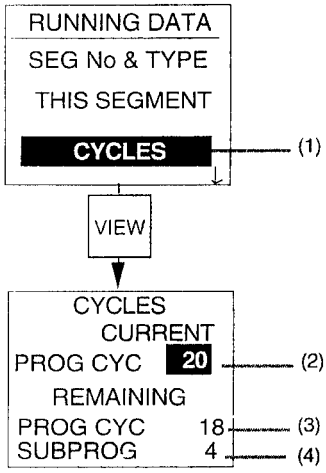


END Information

(1) Indicates the programme working setpoint.

(2) Displays the type of segment.

(3) Indicates the type of END function.



CYCLING Information

To alter the programmer cycle count the programmer must be RESET.

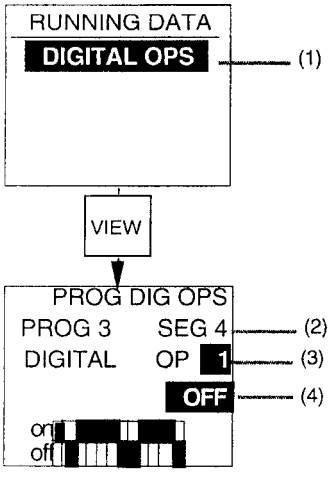
(1) Scroll to highlight and press the VIEW key to access.

(2) Indicates how many times the programme was set to run initially.

(3) Indicates the programmer cycles remaining of the current programme.

(4) Indicates the number remaining of the subprogramme cycles when running a subprogramme.

The remaining number of cycles can be altered in HOLD.



DIGITAL Outputs

To change digital outputs the programmer must be put in a HOLD.

(1) Scroll to highlight and press the VIEW key to access.

(2) Indicates the programme number and current segment being actioned.

(3) Scroll to highlight and use the up/down keys to select each output in turn.

(4) Scroll to highlight and use the up/down keys to change any of the digital output conditions on or off as required.

POWER FAILURE STRATEGIES

The programmer has a built in facility, which in the event of a power failure, will carry out a recovery strategy.

Various options are available to the user to decide what powerfail recovery action is most appropriate, when power is restored, these are:-

1) CONTINUE - the programme will continue as if no power fail had occurred

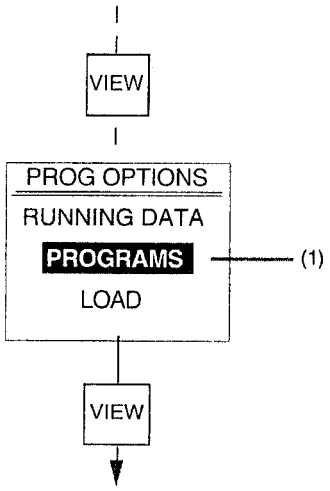
2) RESET PROGRAMME - the programme will be reset

3) SERVO & CONT - the segment will servo to the process value and continue running the programme. If the current segment is a DWELL the programme will ramp back to the target setpoint at the last ramp rate before continuing.

4) PUT INTO HOLD - the programme will go into a HOLD awaiting manual action by the operator.

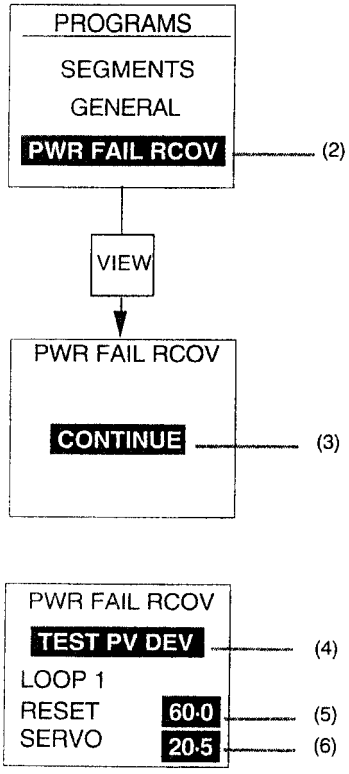
5) TEST PV DEV - a test of the process value deviation is carried out and from the result the programmer will automatically action either 1), 2) or 3).

6) TEST TIME DUR - a test of the duration of the power fail is carried out and from the result the programmer will automatically action either 1), 2) or 3).



Repeatedly press the PAGE until the PROG OPTIONS page is displayed:

(1) Scroll to PROGRAMS and press the VIEW key to select.



(2) Scroll to PWR FAIL RCOV and press the VIEW key to select

(3) Scroll to select either, CONTINUE, RESET PROGRAM, SERVO & CONT, TEST PV DEV, TEST TIME DUR or PUT INTO HOLD.

If TEST PV DEV or TEST TIMEDUR is selected;

(4) Select TEST PV DEV or TEST TIME DUR using the up/down keys.

(5) Set the reset value required, (in engineering units for PV and in seconds for TIME)

(6) Set the servo value required, (in engineering units for PV and seconds for TIME)

On a power fail recovery the respective RESET and SERVO values are checked and if:-

PV deviation or the time is less than the SERVO value the programme will automatically be put into a CONTINUE action.

PV deviation or the time is less than the RESET value but greater than the SERVO value the programme will automatically SERVO & CONTINUE.

PV deviation or the time is greater than the RESET value the programme will automatically RESET.

LEVELS OF OPERATION

Programmes can be operated by manual operation from the front six keys of the instrument, from digital inputs or from digital communications.

Front Panel Keys

From the front panel keys a programme can be placed into a RUN, HOLD or RESET condition.

Digital Inputs

Up to 10 inputs can be utilised to control a programme. Dependent upon the configuration of the programmer the following functions can be available Run/Hold, Hold/Run, Skip current segment, Reset, Run, Hold, Wait until, Run while closed.

Communications

The function of the programmer can be fully controlled via digital communications. Programmes can be loaded and unloaded, and individual segments can be modified when a programme is placed in a HOLD or is not loaded.

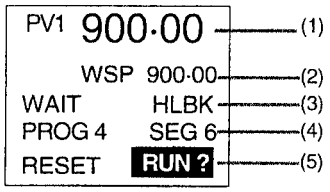
Levels of Operation

The following describes the manual operation of programmes from the six front panel keys. There are three levels of operation in the instrument which are entirely dependent upon the customers requirements.
LEVEL 3 is the supervisors level and it is from this level that the depth of operations of LEVELS 1 and 2 are selected and allocated.

LEVEL 1

For LEVEL 1 operator the following programme displays can be allocated:

A



(1) Process variable value.

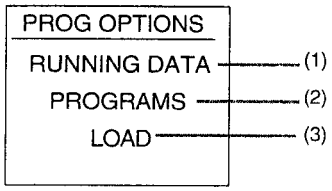
(2) Working setpoint value.

(3) Programmer status.

(4) Programme and current segment numbers.

(5) Programmer state which can be changed.

B

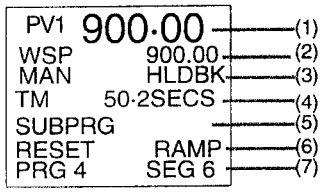


(1) Monitors current programme, segment by segment.

(2) Provides access to all segments especially for creating new programmes.

(3) Can load and unload programmes.

C



(1) Process variable value.

(2) Working setpoint value.

(3) Instrument status.

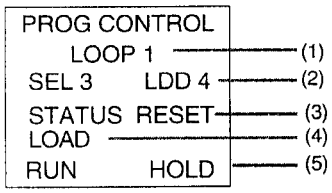
(4) Time remaining of current segment.

(5) Programmer executing subprogramme.

(6) Programme status and segment type.

(7) Programme and current segment number.

D



(1) Loop 1 or 2 if dual loop instrument.

(2) Programme number selected and loaded.

(3) Programme status.

(4) Programme LOAD or RESET facilities.

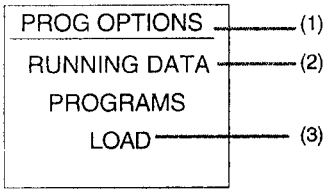
(5) Programme RUN and/or HOLD facilities.

Any combination of these four displays can be made available to the LEVEL 1 operator from none to all four.

LEVEL 2

For a LEVEL 2 operator the following programmer displays can be allocated:

B

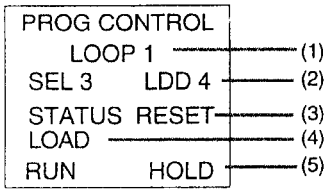


(1) Monitors current programme, segment by segment.

(2) Provides access to all segments.

(3) Can load and unload programmes.

D



(1) Loop 1 or 2 if dual loop instrument.

(2) Programme number selected and loaded.

(3) Programme status.

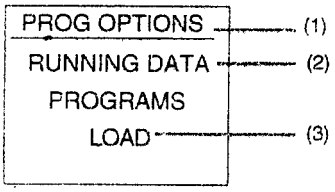
(4) Programme LOAD or RESET facilities.

(5) Programme RUN and/or HOLD facilities.

Both these displays appear in LEVEL 2 but any restrictions on actioning is determined by the LEVEL 3 supervisor.

LEVEL 3

B



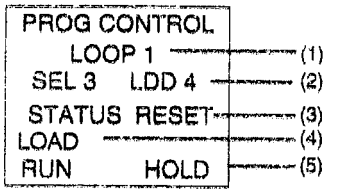
For a LEVEL 3 operator the following programme displays are provided:

(1) Monitors current programme, segment by segment.

(2) Provides access to all segments.

(3) Can load and unload programmes.

D



(1) Loop 1 or 2 if dual loop instrument.

(2) Programme selected and loaded.

(3) Programme status.

(4) Programme LOAD or RESET facilities.

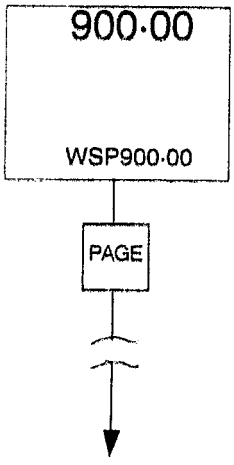
(5) Programme RUN and/or HOLD facilities.

These displays provide the LEVEL 3 operator with full access to the control of the programmer at all times.

Entry to Access Levels

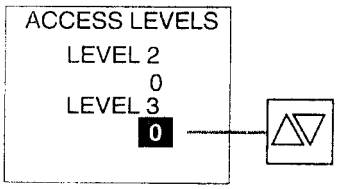
To prevent unauthorised access Levels 2 and 3 are protected by security codes.
To set up Levels 1 and 2 it is necessary to enter Level 3.

Initial Page



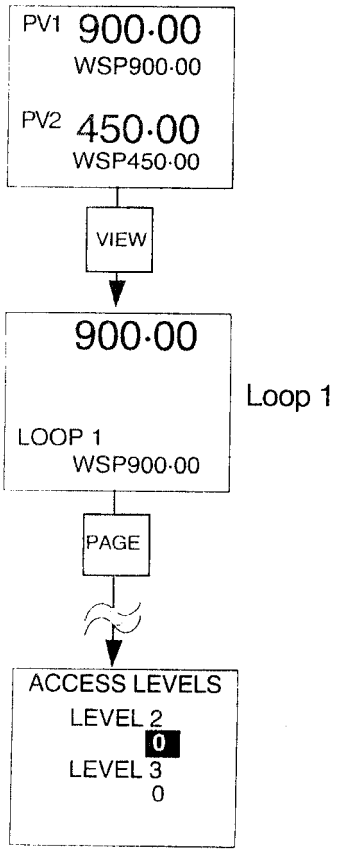
Single Loop Programmer

To enter Level 3, repeatedly press the PAGE key until the ACCESS LEVELS page is displayed. The pages displayed after the initial page and before the ACCESS LEVELS page will vary dependent upon the allocations as set in chapter 3.



Once in the Access Levels page scroll to highlight LEVEL 3 and set the security code by using the up/down keys and press the VIEW key to enter.

Dual Loop Programmer



On switching on press the VIEW key to display LOOP 1. Repeated pressing of the VIEW key causes the LOOP 1 and LOOP 2 displays to alternate. Press the PAGE key once the required loop is selected.

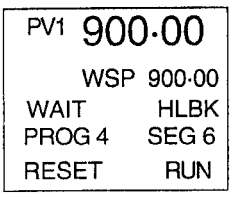
To access Level 3 repeatedly press until the 'ACCESS LEVELS' page is displayed.
Press the SCROLL key to highlight LEVEL 3, and when the security code has been centred press the VIEW key to access.

Security Codes

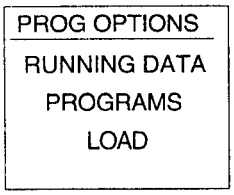
Instruments leave the factory with all the security codes set to zero. To enter a level just scroll to the level required and press the VIEW key.
To install your own security codes see chapter 3. To enter a level then scroll to the level required and set your known security code by means of the up and down keys. Press the VIEW key to enter the code.

The display will revert to zero if the wrong security code has been entered. Enter the correct code and repeat the above operations.

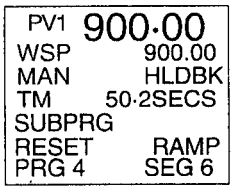
A



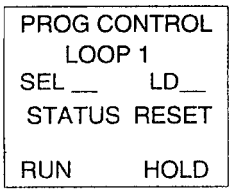
B



C



D



Allocation of Parameters

In LEVEL 3 of the instrument provision is made to the user to define the parameters that can be made available to the LEVEL 1 and LEVEL 2 operators.

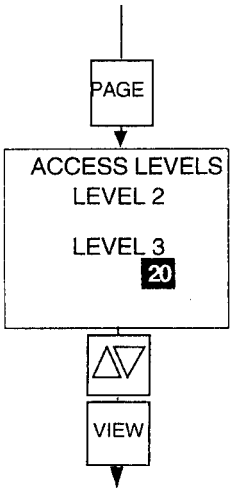
LEVEL 1 Operator

Any combinations of the displays pages A, B, C and D can be made available to the LEVEL 1 operator. In display page B, the PROG OPTIONS page, each of the three parameters, RUNNING DATA, PROGRAMS and LOAD can be made accessible or not. If all three parameters are made not accessible the display page B will not be displayed.

LEVEL 2 Operator

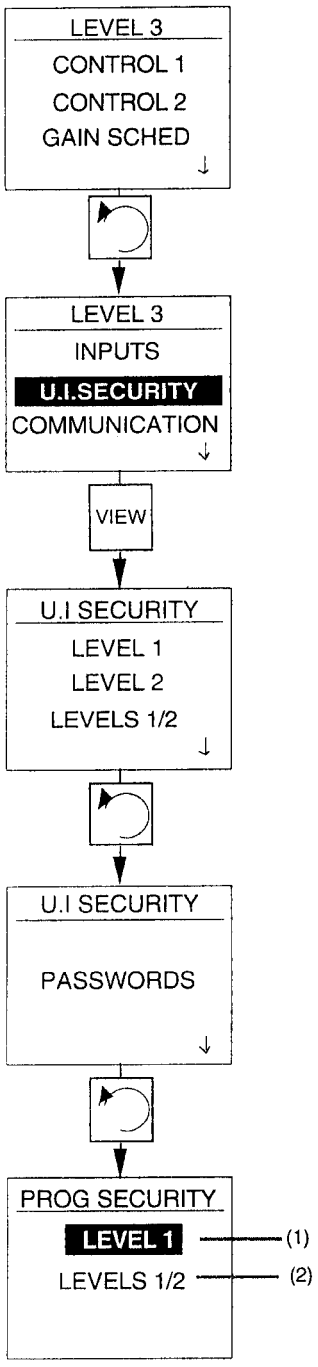
Only display pages B and D can be made available to the LEVEL 2 operator. The three parameters in display page B, RUNNING DATA, PROGRAM and LOAD can be made accessible or not. If all three parameters are made not accessible the display page B will not be displayed.

To allocate the various displays and parameters to the LEVEL 1 and LEVEL 2 operators, proceed as follows:-



Repeatedly press the PAGE key until the ACCESS LEVELS are displayed:

Scroll to LEVEL 3 and enter the required security code using the up/down keys.



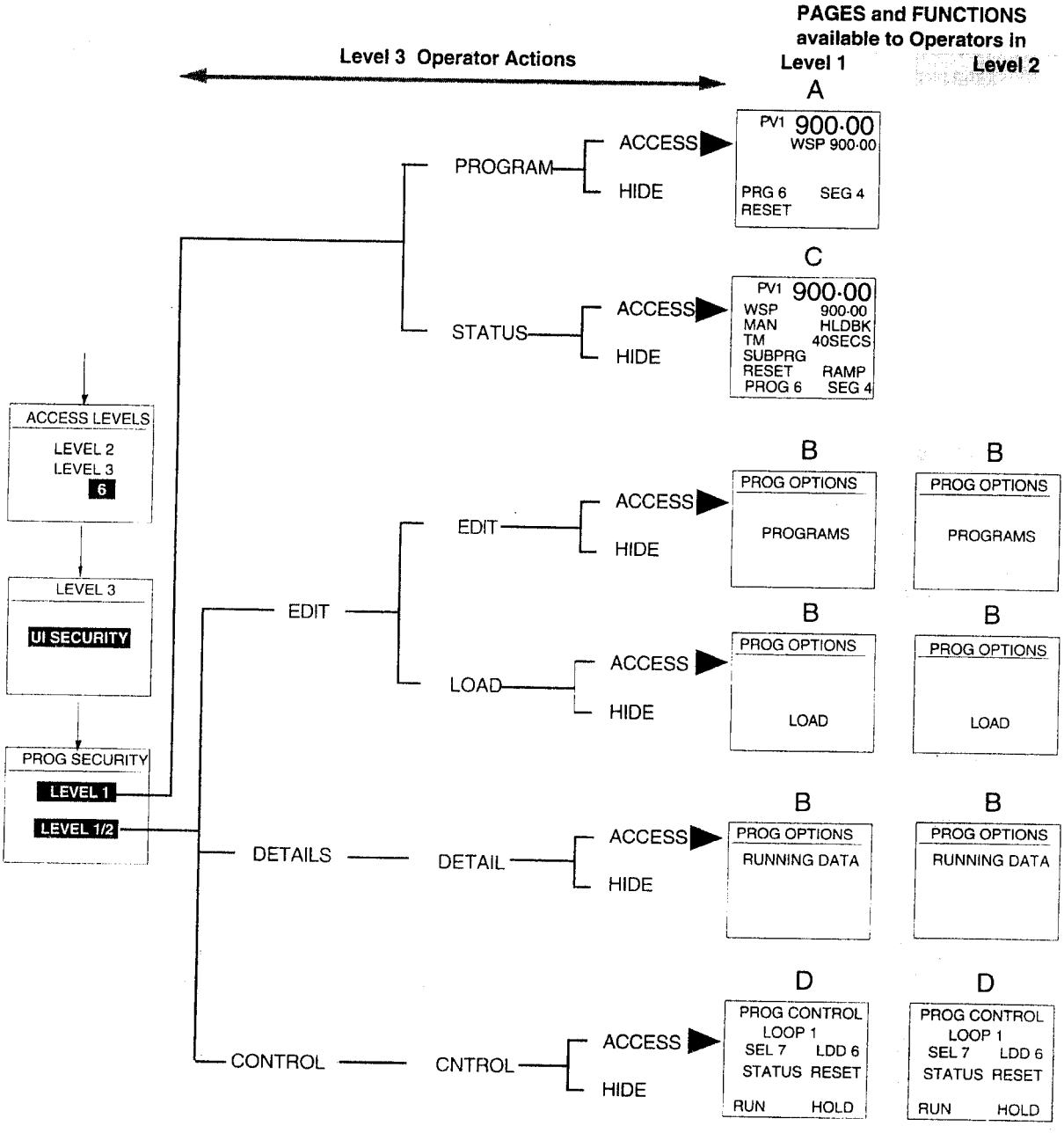
Press the VIEW key to enter LEVEL 3 and repeatedly press the scroll key until U.I SECURITY is highlighted.

Press the VIEW key to enter and repeatedly press the SCROLL key until the PROG SECURITY page is displayed.

Scroll to LEVEL 1 under PROG SECURITY

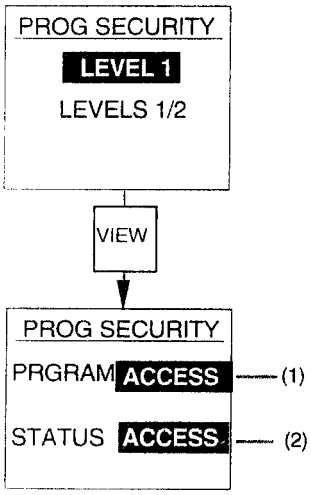
(1) Enter LEVEL1 by pressing the VIEW key. Facilities are provided to make display pages A and C available or not to the LEVEL 1 operator.

(2) Enter LEVELS 1/2 by pressing the VIEW key. Facilities are provided to make display pages B and D and associated parameters either available or not to the respective LEVEL 1/LEVEL 2 operators.



Note:

Page B is not displayed if RUNNING DATA, PROGRAMMES and LOAD are **ALL** selected to be hidden.



LEVEL 1 Operator Displays

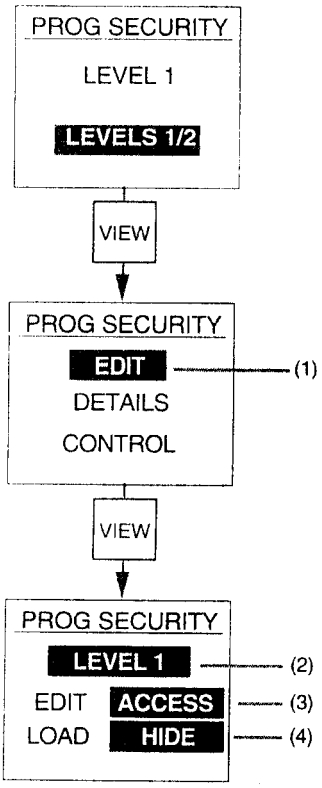
Entry to LEVEL 1 gives access to the operator displays pages A and C. These displays can be made accessible or not to the LEVEL 1 operator.

(1) PRGRAM can be set to access or hide by means of the up/down keys. If set to ACCESS then display page A will be available to the LEVEL 1 operator. If HIDE selected then display page A will not be seen.

(2) STATUS can be set to ACCESS or HIDE by means of the up/down keys. Therefore display page C can be made available or not to the LEVEL 1 operator.

LEVEL 1/2 Operator Displays

Entry to LEVELS 1/2 gives access to operator displays and parameters that can be made available to either the LEVEL 1 or LEVEL 2 operators or both. Display page D, and parameters RUNNING DATA, PROGRAM and LOAD can be made accessible or not to the LEVEL 1 and LEVEL 2 operators.



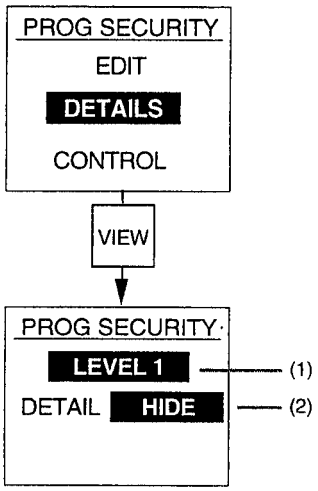
EDIT

(1) The EDIT facility affects the PROG OPTIONS display page B functions. The PROGRAMS/LOAD parameters using display page B can be made accessible or not to the LEVEL 1/2 operators.

(2) Select LEVEL 1 or LEVEL 2 operator levels

(3) Programme editing can be selected as ACCESS, full PROGRAM editing facilities available, or HIDE, no PROGRAM editing available in display page B.

(4) Facility to LOAD programmes can be made accessible (ACCESS) or not (HIDE) to the LEVEL 1/2 operators using display page B.



DETAILS

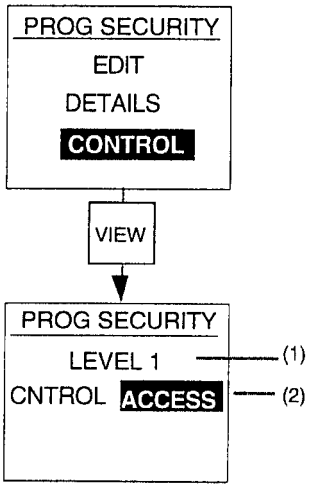
The DETAILS facility effects the RUNNING DATA in the PROG OPTIONS page, see display page 'B.' This can be made accessible (ACCESS) or not (HIDE) to the LEVEL 1/2 operators using display page B.

(1) Select LEVEL 1 or LEVEL 2 operator levels.

(2) When set to HIDE this inhibits access to the PROGRAMS in the PROG OPTIONS page, display page B. When set to ACCESS normal entry is permitted to the PROGRAM functions.

CONTROLS

The CONTROL facility causes the PROG CONTROL display page D to be accessible (ACCESS) or not (HIDE) to the LEVEL 1/2 operators.



(1) Select LEVEL 1 or LEVEL 2 operator levels.

(2) The PROG CONTROL Display D, which actions a completed programme, can be made to be accessible or not to the respective operators when CNTROL is set to ACCESS or HIDE.

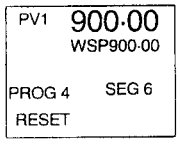
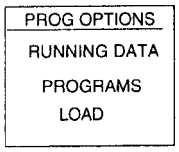
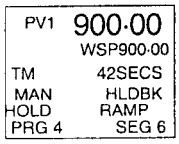
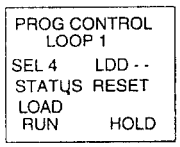
Note:-

Display A and C are not available to the LEVEL 2 operator.

When all the parameters in Display B are made not accessible then Display B is not accessible.

Level Operator Functions

There are three levels of operation. The facilities available to the operators will depend on which functions have been allocated to the respective levels of operation, see table below.

	Display Pages	Operators			Facilities Available							
		LEVEL 1	LEVEL 2	LEVEL 3	LOAD	RUN	HOLD	RESET	CYCLE	FAST RUN	DIG. O/PS	PROGS
A		YES	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO
B		YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES
C		YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D		YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO

DIGITAL INPUTS

The programmer will react to up to 10 digital inputs the functions of which depend upon the instrument configuration, see chapter 4, Digital Inputs.

The following digital inputs are available:

RUN	Run programme - level sensitive
RESET	RESET programme - level sensitive - overrides RUN and HOLD digital inputs
HOLD	HOLD programme - level sensitive - overrides RUN digital input
RUN/HOLD	Switch open to RUN, close to HOLD
HOLD/RUN	Switch open to HOLD, close to RUN
HOLDBACK DIS	Disable Holdback
LP1 SKIP SEG	Skip the current segment of the programme running on Loop 1
LP2 SKIP SEG	Skip the current segment of the programme running on Loop 2
LP1 LSD PRGNO LP1 2LSD PGNO LP1 3LSD PGNO LP1 MSD PRGNO	Binary setting of programme number in Loop1
LP2 LSD PRGNO LP2 2LSD PRGNO LP2 3LSD PGNO LP2 MSD PRGNO	Binary setting of programme number in Loop 2
LP1 WAIT UNTL	Causes programme on Loop 1 to wait
LP2 WAIT UNTL	Causes programme on Loop 2 to wait
BTH WAIT UNTL	Causes both programmes on both Loops to wait
LOAD PROG LP1	Loads programme on Loop 1
LOAD PROG LP2	Loads programme on Loop 2
LOAD PROG BTH	Loads a programme on each Loop

Two inputs are available at all times in the H3 and H4 rear terminal positions. Up to 8 other digital inputs can be input to quad logic input modules on any two of the 6 slot positions, A to F.

Note: WAIT UNTIL - can be configured for either loop 1 or loop 2 or both.

When ever the digital input is active the loop configured waits at the first end of segment encountered. The programme on the loop in question will wait until the digital input becomes inactive.

A programme on one loop can be in WAIT UNTIL even when the programme on the other loop has ended. This can stop the end segment running or stop the other loop cycling round. If WAIT UNTIL is active the SKIP SEGMENT input, if configured, will be ignored.

The programmer must be RESET to load a programme.

APPENDIX 1 GLOSSARY

% OF OUTPUT ..... % of Output Power
% OF SPAN ..... Percentage of Span
0 DEC PLACES ..... Integer Resolution
1 DEC PLACE ..... 1 Decimal Place Resolution
1&2 2LSD PRGN ..... Bit 1 of program number for loop 1 & 2
1&2 2LSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 1
1&2 3LSD PRGN ..... Bit 2 of program number for loop 1 & 2
1&2 LSD PRGNO ..... Bit 0 of program number for loop 1 & 2
1&2 LSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 0
1&2 MSD PRGNO ..... Bit 3 of program number for loop 1 & 2
1&2 MSD SCHD ..... Gain Scheduling set number for loop 1 & 2, bit 2
1&2 SKIP SEG ..... Skip Segment, Loop 1 & 2
1&2 WAIT UNTL ..... Wait until, loop 1 & 2
2 DEC PLACES ..... 2 Decimal Place Resolution
3 DEC PLACES ..... 3 Decimal Place Resolution

A-M LP1 ..... Auto/Manual Loop 1
A-M LP2 ..... Auto/Manual Loop 2
A-M STAT LP1 ..... Auto/Manual Status, Loop 1
A-M STAT LP2 ..... Auto/Manual Status, Loop 2
ABS DIFF ..... Absolute Difference
ACCESS ..... Parameter is accessible
ACK ALARM 1-4 ..... Acknowledge alarms 1 to 4
ACK ALARM 5-8 ..... Acknowledge alarms 5 to 8
ACKED ..... Alarm Acknowledged
ACTIONING ..... Timer action triggering
ADAP FILL LP1 ..... Select Fill Algorithm, Loop 1
ADAP FILL LP2 ..... Select Fill Algorithm, Loop 2
ADAP TUNE 1&2 ..... Select Adaptive Tune, Loop 1 & 2
ADAP TUNE LP1 ..... Select Adaptive Tune, Loop 1
ADAP TUNE LP2 ..... Select Adaptive Tune, Loop 2
ADAPT TUNE ..... Adaptive Tune available
ADT LP1 ..... Adaptive Tune, Loop 1
ADT LP2 ..... Adaptive Tune, Loop 2
ALARM 1 ..... Alarm 1 active
ALARM 1 - 8 ..... Alarm 1 - 8
ALARM 2 ..... Alarm 2 active
ALARM 3 ..... Alarm 3 active
ALARM 4 ..... Alarm 4 active
ALARM 5 ..... Alarm 5 active
ALARM 6 ..... Alarm 6 active
ALARM 7 ..... Alarm 7 active
ALARM 8 ..... Alarm 8 active

ALARM ACK ..... Acknowledge all alarms
ALARM DELAY ..... Alarm Delay configured
ALWAYS ..... Write Value over master comms continously
AND ..... Logical AND operation
ANY ALARM OP ..... Any Alarm active
ANY ALM ..... Any Alarm
ANY DFLT ..... Any Default Value
ANY DFLT CL V ..... Any Default Value in use for Calculated Value
ANY TLSR ..... Any Totaliser
ASCII ..... ASCII representation for numbers
AT LP1 ..... Autotune, Loop 1
AT LP2 ..... Autotune, Loop 2
ATM PRESSURE ..... Atmospheric Pressure Input
AUTO MAN 1&2 ..... Auto Manual Select, Loop 1 & 2
AUTO MAN LP1 ..... Auto Manual Select, Loop 1
AUTO MAN LP2 ..... Auto Manual Select, Loop 2
AUTO TUNE ..... Autotune available
AUTO TUNE 1&2 ..... Select Autotune, Loop 1 & 2
AUTO TUNE LP1 ..... Select Autotune, Loop 1
AUTO TUNE LP2 ..... Select Autotune, Loop 2

BAD SEGMENT ..... Program Segment is incorrect
BAND ..... Band Holdback
BRCST INST ..... Broadcast to slave instruments or Controllers
BRCST THYR ..... Broadcast to slave thyristor stacks (power switches)
BROADCAST DIS ..... Disable Broadcast
BTH BCD1 PGNO ..... BCD Bit 0 of program number for loop 1 & 2
BTH BCD2 PGNO ..... BCD Bit 1 of program number for loop 1 & 2
BTH BCD3 PGNO ..... BCD Bit 2 of program number for loop 1 & 2
BTH BCD4 PGNO ..... BCD Bit 3 of program number for loop 1 & 2
BTH BCD5 PGNO ..... BCD Bit 4 of program number for loop 1 & 2
BTH BCD6 PGNO ..... BCD Bit 5 of program number for loop 1 & 2
BTH BCD7 PGNO ..... BCD Bit 6 of program number for loop 1 & 2
BTH BCD8 PGNO ..... BCD Bit 7 of program number for loop 1 & 2
BURNER 1 ..... Pulse Burner 1 Output
BURNER 2 ..... Pulse Burner 2 Output
BURNER 3 ..... Pulse Burner 3 Output
BURNER 4 ..... Pulse Burner 4 Output
BURNER 5 ..... Pulse Burner 5 Output
BURNER 6 ..... Pulse Burner 6 Output
BURNER 7 ..... Pulse Burner 7 Output
BURNER 8 ..... Pulse Burner 8 Output

CALC VALUE ..... Calculated Values available
CALC VALUE 1 ..... Calculated Value 1
CALC VALUE 2 ..... Calculated Value 2

CALC VALUE 3 ..... Calculated Value 3
CALC VALUE 4 ..... Calculated Value 4
CALC VALUE 5 ..... Calculated Value 5
CALC VALUE 6 ..... Calculated Value 6
CALC VALUE 7 ..... Calculated Value 7
CALC VALUE 8 ..... Calculated Value 8
CALIB STOPPED ..... Calibration Stopped
CALIB STOPPED ..... Calibration Stopped
CASCADE TRACK ..... Tracking in Cascade Mode available
CASCADE TUNE ..... Select Cascade Tune
CASCDE ENABLE ..... Enable Cascade Control
CJC CALIB ..... CJC Calibration
CLEAN PROBE ..... Clean Probe (Carbon Potential)
CLEAN VALVE ..... Valve Clean Status
CLOCK RUNNING ..... The Real Time Clock is operating normally
CLOCK STOPPED ..... The Real Time Clock has been stopped
CNFM GET DFLT ..... Confirm Default Calibration Fetch
CNFM MOD BKUP ..... Confirm Module Backup Fetch
COMMS OK ..... Master Comms Channel 1 OK
COMMS1OK ..... Master Comms Channel 1 OK
COMMS2OK ..... Master Comms Channel 1 OK
COMMS3OK ..... Master Comms Channel 1 OK
COMMS4OK ..... Master Comms Channel 1 OK
COMMS5OK ..... Master Comms Channel 1 OK
COMMS6OK ..... Master Comms Channel 1 OK
COMMS7OK ..... Master Comms Channel 1 OK
COMMS8OK ..... Master Comms Channel 1 OK
CONFIRM COPY ..... Confirm Copy of Backup Calibration
CONT ADT TUNE ..... Continuous Adaptive Tune
CPY BKUP CALS ..... Copy Backup Calibration
CSCDSTAT ..... Cascade Status
CUSTOM ..... Customer Sign-On Screen
CV1 - 8 ..... Calculated Value 1 - 8

DATA ADR ..... Address of data for master comms
DERIV ON ERR ..... Derivative Calculated on Error
DERIV ON PV ..... Derivative Calculated on Process Measured Value
DEV BAND ..... Deviation Band Alarm
DEV HIGH ..... Deviation High Alarm
DEV LOW ..... Deviation Low Alarm
DFLT ..... Default
DFLT CAL VL 1 ..... Default Value for Calculated Value 1 in use
DFLT CAL VL 2 ..... Default Value for Calculated Value 2 in use
DFLT CAL VL 3 ..... Default Value for Calculated Value 3 in use
DFLT CAL VL 4 ..... Default Value for Calculated Value 4 in use

DFLT CAL VL 5 ..... Default Value for Calculated Value 5 in use
DFLT CAL VL 6 ..... Default Value for Calculated Value 6 in use
DFLT CAL VL 7 ..... Default Value for Calculated Value 7 in use
DFLT CAL VL 8 ..... Default Value for Calculated Value 8 in use
DFLT VL 1 - 8 ..... Default Value 1 - 8
DIG COMMS DIS ..... Disable Digital Comms
DIG IP 1 ..... Digital Input 1
DIG IP 2 ..... Digital Input 2
DIG RETRA DIS ..... Disable Digital Retransmission
DIGITAL OP ..... Digital Output Settings for Segment
DIRECT ACTING ..... Direct Acting (cool) channel
DO HI IP CAL ..... Do Input High Calibration
DO HI OP CAL ..... Do Output High Calibration
DO HIGH CALIB ..... Do High Calibration
DO LO IP CAL ..... Do Input Low Calibration
DO LO OP CAL ..... Do Output Low Calibration
DO LOW CALIB ..... Do Low Calibration
DOSING ALM L1 ..... Dosing alarm, Loop 1
DOSING ALM L2 ..... Dosing alarm, Loop 2
DWELL ..... Dwell Segment Type

EI BISYNC ..... EI Bisynch Communications
EMPTY HOP LP1 ..... Hopper Empty Indicator, Loop 1
EMPTY HOP LP2 ..... Hopper Empty Indicator, Loop 2
END ..... End segment
END SP TOO HI ..... End Segment Setpoint is too high
END SP TOO LO ..... End Segment Setpoint is too low
ENG UNITS ..... Engineering Units
ERROR SCHED ..... Gain Scheduling on Error
EUROTHERM ..... Eurotherm Sign-On Screen
EVEN PARITY ..... Digital Comms with Even Parity (Modbus/Jbus Only)
EXP ..... Exponential Filter
EXTERNAL ..... External Cold Junction Compensation
EXTNL RT CAL ..... External RT Calibration

FAN ..... Fan Cooling
FAST RUN ALWY ..... Fast Run Always
FAST RUN STBY ..... Fast Run in Standby Mode
FEEDFORWARD ..... Feedforward Not Available
FEEDFWD 1 ..... Feedforward, Loop 1
FEEDFWD 2 ..... Feedforward, Loop 2
FEEDFWD LP1 ..... Setpoint Feedforward, Loop 1
FEEDFWD LP2 ..... Setpoint Feedforward, Loop 2
FORMAT ..... Numeric Format to use to use for master comms

FRCD IPS ONLY ..... Force Manual OP using digital inputs only
FRCD KEYS IPS ..... Force Manual OP using keys and digital inputs
FRZ INTEG 1&2 ..... Freeze Integral, Loop 1 & 2
FRZ INTEG LP1 ..... Freeze Integral, Loop 1
FRZ INTEG LP2 ..... Freeze Integral, Loop 2
FRZ OP ..... Freeze Output Power
FS HIGH ..... Full Scale High Alarm
FS LOW ..... Full Scale Low Alarm
FULL RES ..... Full Resolution

G RATIO L1 ..... Gravimetric Ratio Scalar loop 1
G RATIO L2 ..... Gravimetric Ratio Scalar loop 2
GAIN SCHE 1&2 ..... Select Gain Scheduling, Loop 1 & 2
GAIN SCHE LP1 ..... Select Gain Scheduling, Loop 1
GAIN SCHE LP2 ..... Select Gain Scheduling, Loop 2
GET DFLT CALS ..... Get Default Calibration Values
GET MOD BKUP ..... Get Backup for Module Cal
GRAVI MFL LP1 ..... Gravimetric MFL, Loop 1
GRAVI MFL LP2 ..... Gravimetric MFL, Loop 2
GRAVI VALVE 1 ..... Gravimetric Valve 1 Status
GRAVI VALVE 2 ..... Gravimetric Valve 2 Status

HAUL OFF ALM2 ..... Haul off alarm 2
HIDE ..... Hidden (No Access)
HIDE ..... Parameter is hidden
HIGH ..... High Holdback
HIGH LVL CAL ..... High Level Calibration
HLDBK ..... Holdback
HOLD ..... Hold Program
HOLD ALL TLSR ..... Hold all totalisers
HOLD RUN ..... Hold or Run Program (depending on state)
HOLD TLSR 1 ..... Hold Totaliser 1
HOLD TLSR 2 ..... Hold Totaliser 2
HOLD TLSR 3 ..... Hold Totaliser 3
HOLD TLSR 4 ..... Hold Totaliser 4
HOLD? ..... Hold Running Program?
HOLDBACK ..... Holdback
HOLDBACK ..... Holdback Available
HOLDBACK ..... Holdback Value for Program/Segment
HOLDBACK DIS ..... Disable Holdback
HOLDBACK/SEG ..... Individual Holdback for each Segment

IEEE ..... IEEE Float representation for numbers
IF CHNG ..... Write Value over master comms on change only
ILLEGL ADRS ..... Illegal Address

ILLEGL DATA ..... Illegal Data
ILLEGL FCTN ..... Illegal Function
INCOMP ENDS ..... End Segment is incomplete
INDFNTE DWELL ..... Indefinite Dwell
INIT BKUP CAL ..... Initialise Calibration Backup
INPUT1 ..... Input 1
INPUT2 ..... Input 2
INSTRUMENT ..... Slave is an Instrument or Controller
INTEGER RES ..... Integer Resolution
INTERNAL ..... Internal Cold Junction Compensation
INTNL RT CAL ..... Internal RT Calibration

JBUS ..... JBUS Communications

KEYLOCK ENABL ..... Lock Keys on Front Panel

LEVEL1 ..... Level 1
LEVEL2 ..... Level 2
LINEAR ..... Linear Cooling
LOAD PROG 1&2 ..... Load program, loop 1 & 2
LOAD PROG LP1 ..... Load program, loop 1
LOAD PROG LP2 ..... Load program, loop 2
LOADING ..... Program is loading
LOG HLDBK ..... Log Holdback
LOG HLDBK ST ..... Log Holdback indication
LOG HOLD ..... Log Hold Events
LOG HOLD STAT ..... Log Holdback Status indication
LOOP BRK ..... Alarm on Loop Break
LOOP1 ERROR ..... Error, Loop 1
LOOP1 IP ..... Remote Input, Loop 1
LOOP1 OP ..... Output Power, Loop 1
LOOP1 PV ..... Process Measured Value, Loop 1
LOOP1 SCHED ..... Gain Scheduling Loop 1
LOOP1 SP ..... Setpoint, Loop 1
LOOP2 ERROR ..... Error, Loop 2
LOOP2 IP ..... Remote Input, Loop 2
LOOP2 OP ..... Output Power, Loop 2
LOOP2 PV ..... Process Measured Value, Loop 2
LOOP2 SP ..... Setpoint, Loop 2
LOW ..... Low Holdback
LOW LIM 1 ..... Remote Loop 1 Low Power Limit
LOW LIM 2 ..... Remote Loop 1 Low Power Limit
LOWER KEY ..... Function as 'lower' key
LP1 2LSD PGNO ..... Bit 1 of program number for loop 1
LP1 2LSD SCHD ..... Gain Scheduling set number for loop 1, bit 1

LP1 3LSD PGNO ..... Bit 2 of program number for loop 1
LP1 BCD1 PGNO ..... BCD Bit 0 of program number for loop 1
LP1 BCD2 PGNO ..... BCD Bit 1 of program number for loop 1
LP1 BCD3 PGNO ..... BCD Bit 2 of program number for loop 1
LP1 BCD4 PGNO ..... BCD Bit 3 of program number for loop 1
LP1 BCD5 PGNO ..... BCD Bit 4 of program number for loop 1
LP1 BCD6 PGNO ..... BCD Bit 5 of program number for loop 1
LP1 BCD7 PGNO ..... BCD Bit 6 of program number for loop 1
LP1 BCD8 PGNO ..... BCD Bit 7 of program number for loop 1
LP1 CH1 VPFBK..... Loop 1, Channel 1 VP Feedback
LP1 CH1 VPPOS ..... Loop 1, Channel 1 Valve position
LP1 CH2 VPFBK..... Loop 1, Channel 2 VP Feedback
LP1 CH2 VPPOS ..... Loop 1, Channel 2 Valve position
LP1 LSD PRGNO ..... Bit 0 of program number for loop 1
LP1 LSD SCHD..... Gain Scheduling set number for loop 1, bit 0
LP1 MSD PRGNO..... Bit 3 of program number for loop 1
LP1 MSD SCHD..... Gain Scheduling set number for loop 1, bit 2
LP1 SHUNT CAL ..... Shunt Calibration Indication, Loop 1
LP1 SKIP SEG ..... Skip Segment, Loop 1
LP1 WAIT UNTL ..... Wait until, loop 1
LP2 2LSD PGNO ..... Bit 1 of program number for loop 2
LP2 2LSD SCHD ..... Gain Scheduling set number for loop 2, bit 1
LP2 3LSD PGNO ..... Bit 2 of program number for loop 2
LP2 BCD1 PGNO ..... BCD Bit 0 of program number for loop 2
LP2 BCD2 PGNO ..... BCD Bit 1 of program number for loop 2
LP2 BCD3 PGNO ..... BCD Bit 2 of program number for loop 2
LP2 BCD4 PGNO ..... BCD Bit 3 of program number for loop 2
LP2 BCD5 PGNO ..... BCD Bit 4 of program number for loop 2
LP2 BCD6 PGNO ..... BCD Bit 5 of program number for loop 2
LP2 BCD7 PGNO ..... BCD Bit 6 of program number for loop 2
LP2 BCD8 PGNO ..... BCD Bit 7 of program number for loop 2
LP2 CH1 VPFBK..... Loop 2, Channel 1 VP Feedback
LP2 CH1 VPPOS ..... Loop 2, Channel 1 Valve position
LP2 CH2 VPFBK..... Loop 1, Channel 2 VP Feedback
LP2 CH2 VPPOS ..... Loop 1, Channel 2 Valve position
LP2 LSD PRGNO ..... Bit 0 of program number for loop 2
LP2 LSD SCHD..... Gain Scheduling set number for loop 2, bit 0
LP2 MSD PRGNO..... Bit 3 of program number for loop 2
LP2 MSD SCHD..... Gain Scheduling set number for loop 2, bit 2
LP2 SHUNT CA ..... Shunt Calibration Indication, Loop 2
LP2 SKIP SEG ..... Skip Segment, Loop
2LP2 WAIT UNTL ..... Wait until, loop 2

MAN IPS ONLY..... Manual Mode Selectable via digital inputs only
MAN KEYS IPS..... Manual Mode Selectable via keys or digital inputs

MANUAL TRACK ..... Tracking in Manual Mode
MASTER COMMS ..... Master Digital communications
MFL CAL SYNC1 ..... MFL Cal Sync 1
MFL CAL SYNC2 ..... MFL Cal Sync 2
MFL VALID LP1 ..... MFL Valid, Loop 1
MFL VALID LP2 ..... MFL Valid, Loop 2
MNEMONIC ..... Bisynch Mnemonic to use for master comms
MODBUS ..... Modbus Communications

NO ADAPT TUNE ..... Adaptive Tune not available
NO ALRM DELAY ..... Alarm Delay not configured
NO ANA IP FCT ..... No Function
NO AUTO TUNE ..... Autotune not available
NO CALC VALUE ..... Calculated Values not available
NO CAS TRACK ..... No tracking in Cascade Mode
NO CHANGE ..... No Change
NO CJC ..... No Cold Junction Compensation
NO DIG COMMS ..... No Digital Communications
NO FAST RUN ..... Fast Run not Available
NO FEEDFORWRD ..... No Feedforward Available
NO HOLDBACK ..... Holdback Not Available
NO MAN FUNC ..... No Manual Operation allowed
NO MAN TRACK ..... No Tracking in Manual Mode
NO OP FUNCT ..... No Output Function
NO OP RAT LIM ..... No Output Power Rate Limit configured
NO PARITY ..... Digital Comms with No Parity (Modbus/Jbus Only)
NO POWER FB ..... Power Feedback Not Configured
NO PRG DIG OP ..... No Program Digital Outputs
NO PROG LOGIC ..... Prog Logic Not Available
NO PROGRAM ..... Program loaded is invalid
NO RAT TRACK ..... No Tracking in Ratio Mode
NO REM TRACK ..... No tracking in remote
NO REPLY ..... No reply from the slave
NO SP RAT LIM ..... No SP Rate Limit configured
NO SP/PV FFWD ..... No SP/PV Feedforward available
NO STANDBY ..... Standby Mode not available
NO SUBPRG ..... Program contains a reference to an invalid subprogram
NO TIMER FUNC ..... No timer functions available
NO TIMERS ..... No Timer functions
NON CON SEG ..... Non Consecutive Segment
NONE ..... No Function
NORM ..... Normal
NOT ..... Logical NOT operation
NOT CONFIG ..... Not Configured
NOT PID NO OP ..... Not possible to set OP at end because not PID controller

ODD PARITY ..... Digital Comms with Odd Parity (Modbus/Jbus Only)
OIL ..... Oil Cooling
ON/OFF DELAY ..... On/Off Delay
ON/OFF-OP1 ..... On/Off Control on Output 1 only
ON/OFF-OP1&2 ..... On/Off Control on Outputs 1 and 2
OP 1 CH 1 ..... Output 1, Channel 1
OP 1 CH 2 ..... Output 1, Channel 2
OP 2 CH 1 ..... Output 2, Channel 1
OP 2 CH 2 ..... Output 2, Channel 2
OP LEV SCHED ..... Gain Scheduling on Output Power
OP PWR TOO HI ..... Output Power level is too high at end of program
OP PWR TOO LO ..... Output Power level is too low at end of program
OP RATLIM 1&2 ..... Output Power Rate limit, Loop 1 & 2
OP RATLIM LP1 ..... Output Power Rate limit, Loop 1
OP RATLIM LP2 ..... Output Power Rate limit, Loop 2
OP1 CONOP LP1 ..... Control Output 1, Loop 1
OP1 CONOP LP2 ..... Control Output 1, Loop 2
OP1 PWRLM LP1 ..... Output Power Limit, Loop 1
OP1 PWRLM LP2 ..... Output Power Limit, Loop 2
OP1 PWRLV LP1 ..... Output Power Limit and Level, Loop 1
OP1 PWRLV LP2 ..... Output Power Limit and Level, Loop 2
OP2 CONOP LP1 ..... Control Output 2, Loop 1
OP2 CONOP LP2 ..... Control Output 2, Loop 2
OP2 PWRLM LP1 ..... Output 2 Power Limit, Loop 1
OP2 PWRLM LP2 ..... Output 2 Power Limit Loop 2
OR ..... Logical OR operation
ORL ALWAYS ..... Output Power Rate Limit always
ORL AUTO ONLY ..... Output Power Rate Limit in Auto mode only
ORL LP1 ..... Output Rate Limit, Loop 1
ORL LP2 ..... Output Rate Limit, Loop 2

PID-1 & VP-2 ..... Valve Positioning on Channel 2 and PID on Channel 1
PID-OP1 ONLY ..... PID Control on Output 1 only
PID-OP1&OP2 ..... PID Control on Output 1 and 2
POWER FB ..... Power Feedback configured
PRCS VAR 1 ..... Process Measured Value 1
PRCS VAR 2 ..... Process Measured Value 2
PRG CMPLT ..... Program Complete
PRG DG 1 - 12 ..... Program Digital Output 1 - 12
PRG DIG OP ..... Program Digital Outputs
PRG DIG OP 10 ..... Program Digital Output 10
PRG DIG OP 11 ..... Program Digital Output 11
PRG DIG OP 12 ..... Program Digital Output 12
PRG HOLD ..... Program Held

PRG IS SUBPRG ..... Program being loaded is a subprogram
PRG NOT RESET ..... The program is not reset
PRG RESET ..... Program Reset
PRG RUN ..... Program Running
PROBE HEALTH ..... Probe health Status (Carbon Potential)
PROG BUSY ..... Program is busy
PROG CMPLT ST ..... Program Complete Status indication
PROG DIG OP 1 ..... Program Digital Output 1
PROG DIG OP 2 ..... Program Digital Output 2
PROG DIG OP 3 ..... Program Digital Output 3
PROG DIG OP 4 ..... Program Digital Output 4
PROG DIG OP 5 ..... Program Digital Output 5
PROG DIG OP 6 ..... Program Digital Output 6
PROG DIG OP 7 ..... Program Digital Output 7
PROG DIG OP 8 ..... Program Digital Output 8
PROG DIG OP 9 ..... Program Digital Output 9
PROG HLDBK ST ..... Program in Holdback Status indication
PROG HOL STAT ..... Program Hold Status indication
PROG LOGIC ..... Prog Logic Available
PROG RES STAT ..... Program Reset Status indication
PROG RUN STAT ..... Program Run Status indication
PULSE BURNER ..... Pulse Burner Operation
PUT INTO HOLD ..... Put into hold after power fail
PV FEEDFORWRD ..... PV Feedforward configured
PV SCHED ..... Gain Scheduling on Process Value
PV1 BRK ..... PV1 Break Condition
PV1 SNSR BRK ..... Sensor break detected on PV 1
PV2 BRK ..... PV2 Break Condition
PV2 SNSR BRK ..... Sensor break detected on PV 2

R/O ..... Read (View) Only Access
R/W ..... Read/Write Access
RA2 STAT ..... Ratio 2 Status
RAISE KEY ..... Function as 'raise' key
RAMP ..... Ramp Segment Type
RAMP RATE ..... Ramp Rate Ramp Segments
RAT SP DIVIS ..... Ratio Setpoint uses divisor
RAT SP MULTI ..... Ratio Setpoint uses multiplier
RAT SP2 ENAB ..... Enable Ratio Setpoint 2
RAT STAT ..... Ratio Status
RATE CHG ..... Rate of Change Alarm
RATIO ENABLE ..... Enable Ratio Control
RATIO SP 1 ..... Ratio Setpoint 1
RATIO SP TRIM ..... Ratio Setpoint Trim
RATIO TRACK ..... Tracking in Ration Mode

READ VALUE ..... Read a value
RECORDER..... Slave is a Chart Recorder
REGISTER 1 - 12..... Prog Logic Register 1 - 12
REM LIM 1 ..... Remote Power Limit 1
REM LIM 2 ..... Remote Power Limit 2
REM LLV 1 ..... Remote Loop 1 Power Limit
REM LLV 2 ..... Remote Loop 2 Power Limit
REM SP 1 ..... Remote Setpoint 1
REM SP 2 ..... Remote Setpoint 2
REM 1 SCHED..... Gain Scheduling on Rem 1
REM 2 SCHED..... Gain Scheduling on Rem 2
REM ENABL 1&2 ..... Remote Input Enable, Loop 1 & 2
REM ENABL LP1 ..... Remote Input Enable, Loop 1
REM ENABL LP2 ..... Remote Input Enable, Loop 2
REM LP1 ..... Remote Input, Loop 1
REM LP2..... Remote Input, Loop 2
REM1 BRK ..... REM1 Break Condition
REM1 SNSR BRK..... Remote Input break detected on PV 1
REM2 BRK..... REM2 Break Condition
REM2 SNSR BRK ..... Remote Input break detected on PV 2
REMOTE TRACK..... Tracking in remote
RESET ..... Reset Program
RESET PROGRAM..... Reset Program after power fail
RESET TLSR 1 ..... Reset Totaliser 1
RESET TLSR 2 ..... Reset Totaliser 2
RESET TLSR 3 ..... Reset Totaliser 3
RESET TLSR 4 ..... Reset Totaliser 4
RESET? ..... Reset Running Program?
RESOLTN ..... Decimal Resolution to use for master comms
REVERS ACTING ..... Reverse Acting (heat) channel
RMP RATE TGT ..... Time to Target Ramp
RMP RATE TYPE ..... Ramp rate type
RMP RES 0 DEC ..... Integer resolution for ramp rate
RMP RES 1 DEC ..... One decimal place for ramp rate
RMP RES 2 DEC ..... Two decimal places for ramp rate
RMP RES 3 DEC ..... Three decimal places for ramp rate
RMP TIME TGT ..... Ramp Rate Ramp
RST ALARM 1-4 ..... Reset alarms 1 to 4
RST ALARM 5-8 ..... Reset alarms 5 to 8
RST ALL TLSR ..... Reset all totalisers
RST DELAY ALM..... Reset all alarms
RST NO SP TRK..... Reset, No Setpoint Track
RST SP TRACK ..... Reset and Track SP
RUN ..... Run Program
RUN HOLD ..... Run or Hold Program (depending on state)

RUN RESET ..... Run or Reset Program (depending on state)
RUN? ..... Run Program?

SBY ST ..... Standby Status
SCH LP1 ..... Gain Scheduling, Loop 1
SCH LP2 ..... Gain Scheduling, Loop 2
SCHD ON DIGIT ..... Gain Scheduling on Digit
SEG DETAILS ..... Segment Details
SEL MAX ..... Select Maximum Value
SEL MIN ..... Select Minimum Value
SEL REG 1 - 12 ..... Select Register 1 to 12
SELECT IP 2 ..... Select Second Input
SERVO & CONT ..... Servo and Continue after power fail
SERVO FROM PV ..... Servo from Process Measured Value
SERVO FROM SP ..... Servo from Working Setpoint
SET OP ..... Set Output Power
SET OP LEVEL ..... Set Output Power Level
SET OP LEVEL ..... Set Output power level at end of program
SET THE TIME ..... Set the time for the Real Time Clock
SLAVE RESOLTN ..... Resolution of Modbus/JBUS Scaled integers for slave
SLAVE UNITS ..... Slave Process Units
SLT1 - 6 ..... Slot 1 to 6
IP 1 - 4 ..... Input 1 to 4
SNSR BRK ..... Alarm on Sensor Break
SOOTING ..... Alarm on Sooting
SP FEEDFORWRD ..... SP Feedforward configured
SP ONLY LP1 ..... Setpoint Only, Loop 1
SP ONLY LP2 ..... Setpoint Only, Loop 2
SP RATE LIMIT ..... SP Rate Limit configured
SP RATLIM 1&2 ..... Setpoint Rate limit, Loop 1 & 2
SP RATLIM LP1 ..... Setpoint Rate limit, Loop 1
SP RATLIM LP2 ..... Setpoint Rate limit, Loop 2
SP RES 0 DEC ..... Integer SP resolution for program segments
SP RES 1 DEC ..... One decimal place SP resolution for program segments
SP RES 2 DEC ..... Two decimal places SP resolution for program segments
SP RES 3 DEC ..... Three decimal places SP resolution for program segments
SP TRIM LP1 ..... Setpoint Trim, Loop 1
SP TRIM LP2 ..... Setpoint Trim, Loop 2
SP+LOC TRM L1 ..... Setpoint + Local Trim, Loop 1
SP+LOC TRM L2 ..... Setpoint + Local trim for Loop 2
SP1 LOOP1 ..... Select SP1 on loop 1
SP1 LOOP2 ..... Select SP1 on loop 2
SP1 LPS 1&2 ..... Select SP1 on loop 1 & 2
SP2 ENABL 1&2 ..... Second Setpoint Enable, Loop 1 & 2
SP2 ENABL LP1 ..... Second Setpoint Enable, Loop 1

SP2 ENABL LP2 ..... Second Setpoint Enable, Loop 2
SP2 LP1 ..... Second Setpoint, Loop 1
SP2 LP2 ..... Second Setpoint, Loop 2
SP2 STAT LP1 ..... SP2 Active Status, Loop 1
SP2 STAT LP2 ..... SP2 Active Status, Loop 2
SPRG IN SPRG ..... A Subprogram has been referenced from a Program
SRL LP1 ..... Setpoint Rate Limit, Loop 1
SRL LP2 ..... Setpoint Rate Limit, Loop 2
STANDBY ..... Standby Mode available
STANDBY ENABL ..... Enable Standby Mode
STAY AT LIMIT ..... Stay at nearest limit if limit exceeded
STEP ..... Step Segment Type
SUBPGR END ..... Subprogram End
SUBPR ..... Sub Program
SUBPROG ..... Subprogram Segment Type
SUBPROG END ..... Subprogram End Segment (Return)
SWITCH 1 - 4 ..... Switch 1 - 4
SWITCH TO ..... Switch to

TELEMETRY ..... Enable telemetry
TEST PV DEV ..... Test PV deviation
TEST TIME DUR ..... Test time duration
TGT SP TOO HI ..... Target Setpoint is too high
TGT SP TOO LO ..... Target Setpoint is too low
THIRD PV IP ..... Third PV input
THYRISTOR ..... Slave is an Thyristor Stack/Power Switch
TIME TGT TYPE ..... Time to target
TIME TO TGT ..... Time to Target Ramp Segments
TIMED EVENT ..... Timed Event
TIMER 1 ON ..... Turn Timer 1 on
TIMER 2 ON ..... Turn Timer 2 on
TIMER 3 ON ..... Turn Timer 3 on
TIMER 4 ON ..... Turn Timer 4 on
TIMER ACT 1 ..... Timer 1 Active
TIMER ACT 2 ..... Timer 2 Active
TIMER ACT 3 ..... Timer 3 Active
TIMER ACT 4 ..... Timer 4 Active
TIMER DISABL ..... Disable Timer functions
TIMER ST ..... Timer Status
TIMER TRG 1 ..... Timer 1 Trigger Status
TIMER TRG 2 Timer 2 Trigger Status
TIMER TRG 3 ..... Timer 3 Trigger Status
TIMER TRG 4 ..... Timer 4 Trigger Status
TIMER1ACT ..... Timer 1 Action
TIMER1TRG ..... Timer 1 Action

TIMER2ACT ..... Timer 2 Action
TIMER2TRG ..... Timer 2 Action
TIMER3ACT ..... Timer 3 Action
TIMER3TRG ..... Timer 3 Action
TIMER4ACT ..... Timer 4 Action
TIMER4TRG ..... Timer 4 Action
TIMERS ..... Timer Functions
TLMETRY OP ..... Telemetry output
TLMTRY ANA IP ..... Telemetry Analogue Input
TLSR 1 ..... Totaliser 1 Limit reached
TLSR 1 - 4 ..... Totaliser 1 - 4
TLSR 2 ..... Totaliser 2 Limit reached
TLSR 3 ..... Totaliser 3 Limit reached
TLSR 4 ..... Totaliser 4 Limit reached
TLSR1 - 4 ..... Totaliser 1 - 4
TRIGGERED ..... Timer action triggered
TUNE LOOP 1 ..... Tune loop 1
TUNE LOOP 2 ..... Tune loop 2

USE DEFAULT ..... Use default values if limits exceeded
UV1 - 4 ..... User Value 1 - 4

VAL RES 0 DEC ..... Integer Resolution
VAL RES 1 DEC ..... One Decimal Place Resolution
VAL RES 2 DEC ..... Two Decimal Places Resolution
VAL RES 3 DEC ..... Three Decimal Places Resolution
VP OP 1 & 2 ..... Valve Positioning on Channels 1 and 2
VP-1 & PID-2 ..... Valve Positioning on Channel 1 and PID on Channel 2
VP-OP1 ONLY ..... Valve Positioning on Channel 1 only
VP1 BRK ..... VP1 Break Condition
VP1 POS BRK ..... VP Feedback Pot break on VP 1
VP2 BRK ..... VP2 Break Condition
VP2 POS BRK ..... VP Feedback Pot break on VP 2
VPOS % ..... Valve Position %

WAITING ..... Waiting for a timer action
WATER ..... Water Cooling
WORK SP SCHED ..... Gain Scheduling on Working Setpoint
WRITE FAIL ..... Failed to write value to slave
WRKG SP 1 ..... Working Setpoint 1
WRKG SP 2 ..... Working Setpoint 2

XOR ..... Logical XOR operation

ZIR GAS CR IP ..... Zirconia Probe Carbon Input
ZIR PROBE IP ..... Zirconia Probe Input

APPENDIX 2: CUSTOMER CONFIGURATION RECORDS

INSTRUMENT CONFIGURATION

Instrument Type (INSTR TYPE) _____

Process Inputs

	Loop 1	Loop 2
Sensor (LINEAR DEFN)	_____	_____
Linearisation Table(CHARACT TYPE)	_____	_____
Input Range (INPUT RANGE)		
Maximum (MAX)	_____	_____
Minimum (MIN)	_____	_____
Units (UNITS)	_____	_____
Display (DISPLAY RANGE)		
Maximum (MAX)	_____	_____
Minimum (MIN)	_____	_____
Resolution (RESOLN)	_____	_____

Remote Inputs

	Loop 1	Loop 2
Input (LINEAR DEFN).	_____	_____
Input Range (INPUT RANGE)		
Maximum (MAX)	_____	_____
Minimum (MIN)	_____	_____
Units (UNITS)	_____	_____
Display (DISPLAY RANGE)		
Maximum (MAX	_____	_____
Minimum (MIN)	_____	_____
Resolution (RESOLN)	_____	_____

Modules Fitted (SLOT OCCUPANCY)

Slot 1	_____	Slot 2	_____
Slot 3	_____	Slot 4	_____
Slot 5	_____	Slot 6	_____

Module Functions (SLOT FUNCTION)

SLOT 1		SLOT 4	
Function 1	_____	Function 1	_____
Function 2	_____	Function 2	_____
Function 3	_____	Function 3	_____
Function 4	_____	Function 4	_____
SLOT 2		SLOT 5	
Function 1	_____	Function 1	_____
Function 2	_____	Function 2	_____
Function 3	_____	Function 3	_____
Function 4	_____	Function 4	_____
SLOT 3		SLOT 6	
Function 1	_____	Function 1	_____
Function 2	_____	Function 2	_____
Function 3	_____	Function 3	_____
Function 4	_____	Function 4	_____

Digital Input Functions (DIG IP FUNCTIONS)

Dig IP 1	_____	Dig IP 2	_____

Control Definition

Loop 2 _____ Loop 2 _____

Ratio Type _____

USER CONFIGURATION

Alarms

Alarm Number	1	2	3	4
Alarm Type				
Parameter				
Latching				
Hysterisis				
Delay				
Alarm Number	5	6	7	8
Alarm Type				
Parameter				
Latching				
Hysterisis				
Delay				

Control Configuration

	Loop 1	Loop 2
Reverse / Direct		
Derivative Action		
Power Feedback		

SP Tracking

	Loop 1	Loop 2
Manual		
Remote		
Ratio		
Cascade		

Function Availability (FN Available)

Loop Independant Standby _____ Timers _____

	Loop 1	Loop 2
Comms Remote	_____	_____
SP Rate Limit	_____	_____
Manual Mode	_____	_____
OP Rate Limit	_____	_____
SP/PV FFWD	_____	_____
Feedforward	_____	_____

Tuning Configuration

	Loop 1	Loop 2
Autotune	_____	_____
Adaptive Tune	_____	_____
Gain Scheduling	_____	_____

Digital Comms

Protocol _____ Parity _____ Resolution _____

Output Configuration

	Loop 1	Loop 2
Cooling	_____	_____

Anal OP Conf

Slot 1	Max ____	Min ____	Units ____
Slot 2	Max ____	Min ____	Units ____
Slot 3	Max ____	Min ____	Units ____
Slot 4	Max ____	Min ____	Units ____

Slot 5	Max ____	Min ____	Units ____
Slot 6	Max ____	Min ____	Units ____

Anal OP Rng

Slot 1	Max ____	Min ____
Slot 2	Max ____	Min ____
Slot 3	Max ____	Min ____
Slot 4	Max ____	Min ____
Slot 5	Max ____	Min ____
Slot 6	Max ____	Min ____

Input Definition

Filter Defn.
(PV1)_____ (PV2)_____ (REM1) _____ (REM2) _____

Sample
Rate _____ Mains _____

CJC Definition

	Loop 1	Loop 2
Type	_____	_____
Value	_____	_____

Sense

(PV1)	(PV2)	(REM1)	(REM2)
—	—	—	—

Derived I/P Conf

	Loop 1	Loop 2
IP1 FRCT	_____	_____
IP2 FRCT	_____	_____
Max	_____	_____
Min	_____	_____

Scaling Type _____

Customer Linearisation

Point.	Input Value 1	Displayed Value 1	Input Value 2	Displayed Value 2
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Sensor Break Position

PV1	PV2	REM1	REM2

Carbon Potential

Probe Type Oxygen (%, VPM ou LOG)

Max _____ Min _____ Res. _____

Program Configuration

Sub-Programs _____ Holdback _____ Digital Outputs _____

Fast Run _____ Number of Programs available _____

Instrument Units

PV Inputs : Loop 1 Loop 2

PID _____ PB _____ TI & TD _____

Ramp Limits : Setpoint _____ Output _____

Norm/Inv I/O

Slot 1 _____ Slot 2 _____

Slot 3 _____ Slot 4 _____

Slot 5 _____ Slot 6 _____

Totaliser Configuration

Total 1	Total 2	Total 3	Total 4

User Wiring

Availability
User Wiring _____ Prog Logic _____ User Screens _____

WIRING

Calc Value	Coefficient 1	Input 1	Operator	Coefficient 2	Input 2	Wired to
1						
2						
3						
4						
5						
6						
7						
8						

Calc Value	High Limit	Low Limit	Resolution	Default Value
1				
2				
3				
4				
5				
6				
7				
8				

User Value	High Limit	Low Limit	Resolution
1			
2			
3			
4			

Logical Value	NOT	Input 1	Operator	NOT	Input 2	Wired To
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

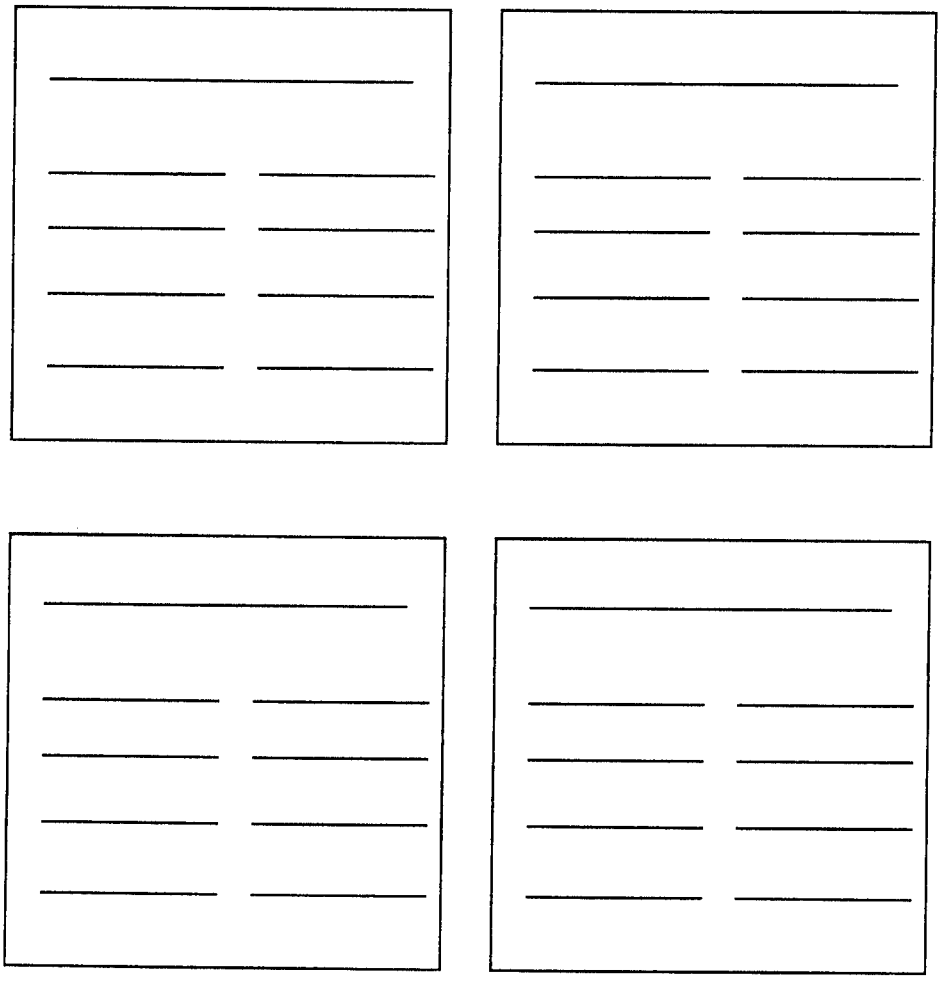
Valve Position Feedback Pot

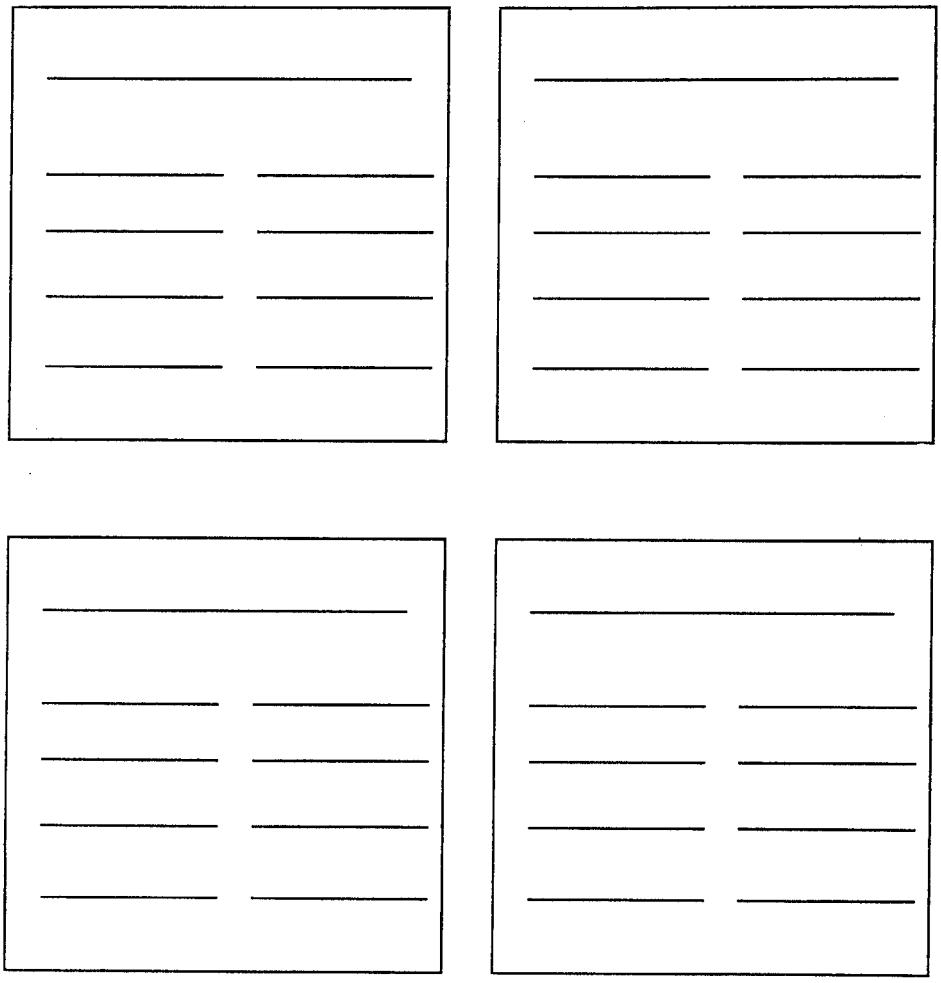
	Loop 1	Loop 2
% Closed	_____	_____
% Open	_____	_____

Configuration of timers

Timer	Type	Input	Wired to
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____

User Screens





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